Appendix 9.

National Vegetation Classification System (NVCS) for Wind Cave National Park

- Created and compiled by Don Faber-Langendoen, Jim Drake, and Hollis Marriott of the TNC

NOTE: "*" Indicates a new formation to the National Vegetation Classification System

Pinus ponderosa / Prunus virginiana Forest

COMMON NAME	Ponderosa Pine / Choke Cherry Forest
SYNONYM	Ponderosa Pine/Chokecherry Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.b)
ALLIANCE	*Pinus ponderosa* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in eastern Montana, eastern and northern Wyoming, western South Dakota, and western Nebraska.

Wind Cave National Park

Ponderosa pine/chokecherry vegetation is common at Wind Cave NP. It is scattered throughout the forested areas west of NPS Rd. 5, and on Boland Ridge. Exemplary stands are found in Cold Brook Canyon near the west Park boundary, near the Centennial trailhead just above Beaver Creek and in the drainage bottom of the south fork of upper Blacktail Creek (east side of Boland Ridge.

ENVIRONMENTAL DESCRIPTION

Globally

This is one of the most mesic ponderosa pine communities. It occurs on gentle to moderate (2-40%) north facing slopes and close to streams (Hansen and Hoffman 1988). A few stands are on rolling uplands. The soils are sandy loam or loam.

Wind Cave National Park

Stands of ponderosa pine/chokecherry occur on moderately steep to steep slopes with northerly aspects. This community is more common on lower slopes, which tend to be more shaded and mesic than the slopes above.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Tree canopy	*Pinus ponderosa*
Shrub	*Amelanchier alnifolia, Mahonia repens, Prunus virginiana*

Wind Cave National Park

Stratum	Species
Tree canopy	*Pinus ponderosa*
Shrub	*Prunus virginiana*
Herbaceous	*Carex inops* ssp. *heliophila, Muhlenbergia racemosa, Poa pratensis*

CHARACTERISTIC SPECIES

Globally

Pinus ponderosa, Prunus virginiana

Wind Cave National Park

Pinus ponderosa, Prunus virginiana

VEGETATION DESCRIPTION

Globally

This forest community has a closed canopy made up of *Pinus ponderosa*. Hansen and Hoffman (1988) found that the basal area ranged from 36.6-63.5 m2/ha in five stands in southeastern Montana. Seedlings and saplings of *Crataegus succulenta* and *Fraxinus pennsylvanica* are often scattered in the understory. These species may grow to be mature trees near streams. There are two shrub

layers in this community. Together they had an average cover of 87% in five stands sampled by Hansen and Hoffman (1988). The most prominent layer is approximately 1 meter tall and dominated by *Prunus virginiana. Amelanchier alnifolia* also contributes significantly to this layer. The lower shrub layer is approximately 50 cm tall. It is dominated by *Mahonia repens* with lesser amounts of *Ribes missouriense, Rosa woodsii*, and *Symphoricarpos albus*. The diversity of forbs is moderate, but most of the coverage of the herbaceous layer is provided by graminoids. *Apocynum androsaemifolium, Elymus caninus, Galium boreale, Schizachne purpurescens,* and *Maianthemum stellatum* are typical components of the herbaceous layer.

Wind Cave National Park
Stands of ponderosa pine/chokecherry are characterized by high canopy coverage, with ponderosa pine cover often greater than 60%. It is common to have a subcanopy of smaller pines as well. Shrub cover usually is greater than 25% and dominated by chokecherry. Codominants may include common juniper (*Juniperus communis*), ninebark (*Physocarpus monogynous*), snowberry (*Symphoricarpos albus*), poison ivy (*Toxicodendron pubescens*) and/or currants (*Ribes* spp.). Herbaceous cover is moderate (usually less than 50%), and commonly dominated by graminoids such as green needlegrass (*Nassella viridula*), Kentucky bluegrass (*Poa pratensis*), Canada wildrye *(Elymus canadensis*), marsh muhly (*Muhlenbergia racemosa*) and sunsedge (*Carex inops* ssp. *heliophila*).

The ponderosa pine/chokecherry type is fairly consistent in terms of tree and shrub species. However, other shrubs are occasionally codominant, including common juniper (*Juniperus communis*), ninebark (*Physocarpus monogynous*), snowberry *(Symphoricarpos albus*) poison ivy (*Toxicodendron pubescens*) and/or currants (*Ribes* spp.).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4

DATABASE CODE CEGL000192

MAP UNITS
The ponderosa pine/chokecherry community corresponds to map unit 47, ponderosa pine/chokecherry forest, on the Wind Cave vegetation map. Chokecherry shrubland with standing dead trees and few or no living trees corresponds to map unit 12, chokecherry shrubland (with burned ponderosa pine).

COMMENTS
Wind Cave National Park
The ponderosa pine/chokecherry type grades into the ponderosa pine/common juniper type. Some stands were found that included significant amounts of both common juniper and chokecherry, making
classification difficult. Stands of chokecherry with standing dead trees (usually burned) and scattered or no living trees are classified as chokecherry shrubland, but are mapped as a burned type on the Wind Cave vegetation map.

REFERENCES
Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A habitat type classification. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station General Technical Report RM-157. Fort Collins, CO. 68 p.

Hoffman, G.R. and R.R. Alexander. 1987. Forest vegetation of the Black Hills National Forest of South Dakota and Wyoming: A habitat type classification. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station Res. Pap. RM-276. Fort Collins, CO. 48 p.

Pfister, R.D., B.L. Kovalchik, S.F. Arno, and R.C. Presby. 1977. Forest habitat types of Montana. USDA Forest Service General Technical Report, INT-34. Intermountain Forest and Range Experiment Station, Ogden, UT. 174 pp.

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 p.

Fraxinus pennsylvanica - Ulmus americana / Symphoricarpos occidentalis Forest

COMMON NAME	Green Ash - American Elm / Wolfberry Forest
SYNONYM	Ash - Elm / Wolfberry Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Lowland or submontane cold-deciduous forest (I.B.2.N.a)
ALLIANCE	*Fraxinus pennsylvanica - (Ulmus americana)* Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in southern Manitoba, North Dakota and South Dakota. Its range within these states and province is not known.

Wind Cave National Park

Mappable stands of green ash/western snowberry vegetation occur in drainages east of the Park. These areas are under private ownership, and were not accessible for survey.

ENVIRONMENTAL DESCRIPTION

Globally

This community occurs on upland sites along steep north-facing slopes and, occasionally, along intermittent drainages or near the bases of north-facing slopes of upland sites. Soils are moist to dry and poorly drained. Girard et al. (1989) found this community on silty clay and clay soils.

Wind Cave National Park

Mappable stands of green ash/western snowberry vegetation occur in drainages east of the Park. These areas are under private ownership, and were not accessible for survey.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Tree canopy	*Fraxinus pennsylvanica, Juniperus virginiana, Ulmus americana*
Short shrub	*Symphoricarpos occidentalis*

Wind Cave National Park

Stratum	Species

Information not available.

CHARACTERISTIC SPECIES

Globally

Fraxinus pennsylvanica, Ulmus americana, Symphoricarpos occidentalis

Wind Cave National Park

Information not available.

VEGETATION DESCRIPTION

Globally

This community is a moderately to densely vegetated forest with an open to dense shrub understory. The average height of the tree layer varies from 5 to 8 meters (US Army Corps of Engineers 1979, Girard et al.1989). The tree layer is dominated by *Fraxinus pennsylvanica* and *Ulmus americana.* Widely scattered old *Populus deltoides* may occur. The shrub layer is dominated by *Symphoricarpos occidentalis*. Other shrubs that can be found are *Rosa woodsii, Juniperus scopulorum* (which can also be in the canopy or subcanopy), and *Prunus virginiana. Symphoricarpos occidentalis* tends to increase under grazing pressure and it may be

almost the only shrub where grazing has been intense. Herbaceous species that may be found in this community are *Pascopyrum smithii, Andropogon gerardii, Poa* spp., *Carex* spp. (wide leaf), *Rumex* spp., *Carex filifolia, Anemone cylindrica, Oryzopsis micrantha, Galium* spp., *Anemone canadensis, Taraxacum* spp., *Lappula* spp., *Conyza canadensis,* and *Circium* spp.

Wind Cave National Park
Mappable stands of green ash/western snowberry vegetation occur in drainages east of the Park. These areas are under private ownership, and were not accessible for survey.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G5

DATABASE CODE CEGL002082

MAP UNITS
The green ash - American elm/western snowberry community corresponds to map unit 43, green ash - American elm/western snowberry forest, on the Wind Cave vegetation map.

COMMENTS

REFERENCES
Girard, M.M., H. Goetz, and A.J. Bjugstad. 1989. Native woodland habitat types of southwestern North Dakota. Research Paper RM-281. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 36 p.

U.S. Army Corps of Engineers. 1979. A cultural resources reconnaissance of the federal lands on the east bank of Lake Francis Case, South Dakota. U.S. Army Engineer District, Corps of Engineers, Omaha, NE.

Acer negundo / Prunus virginiana Forest

COMMON NAME	Ashleaf Maple / Choke Cherry Forest
SYNONYM	Box Elder / Chokecherry Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Temporarily flooded cold-deciduous forest (I.B.2.N.d)
ALLIANCE	*Acer negundo* Temporarily Flooded Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is found in Montana, Wyoming, Colorado, and South Dakota.

Wind Cave National Park

Boxelder/chokecherry stands are found in drainages throughout Wind Cave NP. Exemplary stands occur in the Beaver Creek drainage up- and downstream from Highway 385, along Cold Spring Creek near the west Park entrance, along Highland Creek in the canyon west of NPS Rd. 5, and in the Blacktail drainage near the east Park boundary.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found in mesic situations, usually near streams or rivers or broad alluvial floodplains at warm elevations.

Wind Cave National Park

The boxelder/chokecherry community typically occurs in drainage bottoms on level sites.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Tree canopy	*Acer negundo*
Shrub	*Cornus stolonifera, Prunus virginiana*

Wind Cave National Park

Stratum	Species
Tree canopy	*Acer negundo, Fraxinus pennsylvanica*
Shrub	*Prunus virginiana*

CHARACTERISTIC SPECIES

Globally

Acer negundo, Prunus virginiana

Wind Cave National Park

Acer negundo, Prunus virginiana

VEGETATION DESCRIPTION

Globally

This is an early successional community dominated by *Acer negundo. Populus tremuloides* may also be found. Tree density may be moderate to high. Shrubs are common and vary from short (<1 m) to tall (>2 m). *Prunus virginiana* and *Cornus stolonifera* are common. At Wind Cave NP, these woodlands vary in composition, with *Acer negundo* usually present, but *Prunus virginiana* frequently absent. Tree cover typically is in the 10 - 25% range. *Acer negundo* is most consistently present, but other tree species may be present or even common, including *Ulmus americana, Quercus macrocarpa, Fraxinus pennsylvanica* and *Populus deltoides*. Total shrub cover (tall and short shrubs) is often is greater than 50%. Other common species, in addition to *Prunus virginian*, include *Rhus trilobata, Symphoricarpos occidentalis, Ribes aureum* and *Rhus pubescens*. Herbaceous cover is variable, but usually less than

50%. Species composition varies; common species include *Poa pratensis, Monarda fistulosa* and *Apocynum cannibinum* (Hollis Marriott personal communication 1999). In Colorado, dense thickets of *Prunus virginiana* may occur. When left undisturbed, the shrub canopy can be very thick and nearly impenetrable. However, many stands in Colorado are in severely degraded states with very sparse shrub canopies (CO NHP personal communication 1998).

Wind Cave National Park
Boxelder/chokecherry woodlands vary in composition, with boxelder usually present, but chokecherry frequently absent. Tree cover typically is in the 10 - 25% range. Boxelder is most consistently present, but other tree species may be present or even common, including American elm (*Ulmus americana*), bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*) and Plains cottonwood (*Populus deltoides*). Total shrub cover (tall and short shrubs) often is greater than 50%. In addition to chokecherry, squaw-bush (*Rhus trilobata*), western snowberry (*Symphoricarpos occidentalis*), golden currant (*Ribes aureum*) and poison ivy (*Rhus pubescens*) may be common shrub components. Herbaceous cover is variable, but usually less than 50%. Species composition varies; common species include Kentucky bluegrass (Poa pratensis), wild bergamot bee-balm (*Monarda fistulosa*) and dogbane (*Apocynum cannibinum*).

The composition of this community varies. Boxelder is usually present, but chokecherry may be absent. Other tree species may be present or even common, including American elm (*Ulmus americana*), bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*) and Plains cottonwood (*Populus deltoides*).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

DATABASE CODE CEGL000628

MAP UNITS
The boxelder/chokecherry community corresponds to map unit 41, boxelder/chokecherry woodland, on the Wind Cave vegetation map. Isolated patches and trees of other hardwood species are mapped as 42, bur oak stand, and 44, birch-aspen woodland stand.

COMMENTS
Wind Cave National Park
Many of the boxelder/chokecherry stands at Wind Cave NP were visited for observation points, plots, or accuracy assessment points.

REFERENCES
Hansen, P., K. Boggs, R. Pfister. 1991. Classification and management of riparian and wetland sites in Montana. Unpublished draft version prepared for Montana Riparian Association, Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula, MT. 478 pp.

Kittel, G., R. Rondeau, N. Lederer and D. Randolph. 1994. A classification of the riparian vegetation of the White and Colorado River basins, Colorado. Final report submitted to Colorado Department of Natural Resources and the Environmental Protection Agency. Colorado Natural Heritage Program, Boulder, CO. 166 pp.

Osborn, R., G. Kittel, and M. Reid. 1998. Colorado Riparian Plant Associations and Western States Vegetation Classification. CDROM. U.S. Geological Survey, Mid-Continent Ecology Research Center, Fort Collins, CO.

Pinus ponderosa / Juniperus communis Woodland

COMMON NAME	Ponderosa Pine / Common Juniper Woodland
SYNONYM	Ponderosa Pine/Common Juniper Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a)
ALLIANCE	*Pinus ponderosa* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in eastern Montana, the Bighorn Mountains in northern Wyoming and the Black Hills of western South Dakota and eastern Wyoming.

Wind Cave National Park

Ponderosa pine/common juniper vegetation is uncommon at Wind Cave NP, and is restricted to the western part. It is more common to the west on Forest Service lands.

ENVIRONMENTAL DESCRIPTION

Globally

This community is most often found on moderate north and west facing slopes (Hansen and Hoffman 1987, Hoffman and Alexander 1987, Hoffman and Alexander 1976). The soils are shallow and loamy. They develop from limestone or igneous rock.

Wind Cave National Park

Stands of ponderosa pine/common juniper are best developed on moderately-steep to steep slopes with northerly aspects. Mappable stands are found only in the western part of the Park, which is underlain by granitic rocks. This community becomes more common to the west on National Forest lands.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Tree canopy	*Pinus ponderosa*
Tree sub-canopy	*Pinus ponderosa*
Short shrub	*Juniperus communis*
Herbaceous	*Carex inops* ssp. *heliophila*

Wind Cave National Park

Stratum	Species
Tree canopy	*Pinus ponderosa*
Short shrub	*Juniperus communis, Prunus virginiana*
Herbaceous	*Carex inops* ssp. *heliophila, Danthonia spicata*

CHARACTERISTIC SPECIES

Globally

Achillea millefolium, Juniperus communis, Mahonia repens

Wind Cave National Park

Pinus ponderosa, Carex inops ssp. heliophila

VEGETATION DESCRIPTION

Globally

This community is dominated by *Pinus ponderosa* in the overstory. Other tree species that may be present are *Picea glauca* and *Populus tremuloides*. The canopy is usually moderately closed but can become nearly closed in stands that are not disturbed for long periods. There is a prominent low shrub layer whose most abundant component is *Juniperus communis.* This species covered an average of 25% (range of 4-42%) in 7 stands in the Black Hills of South Dakota and Wyoming (Hoffman and Alexander 1987). Total average cover by the shrub layer was 51% and by the herb layer was 8%. Other shrub species found in this community across its range are *Arctostaphylos uva-ursi, Mahonia repens, Spiraea betulifolia*, and *Symphoricarpos albus.* Typical herbaceous species are *Achillea millefolium, Carex inops* ssp. *heliophila, Schizachyrium scoparium, Fragaria* spp., and *Lathyrus ochroleucus* (McAdams et al.1998).

One site of this community in the Black Hills was reported to have significant Pinus flexilis in it (Thilenius 1970).

Wind Cave National Park
Stands of ponderosa pine/common juniper are characterized by high canopy coverage, with ponderosa pine cover often greater than 75%. A subcanopy of smaller pines may be present. The understory usually is sparse. Common juniper is present but not abundant, with shrub cover usually less than 20%. Codominants may include chokecherry (*Prunus virginiana*), ninebark (*Physocarpus monogynous*), snowberry (*Symphoricarpos albus*) and/or currants (*Ribes* spp.). Herbaceous cover typically is very sparse, often less than 5%. Poverty oatgrass (*Danthonia spicata*) and sunsedge (*Carex inops* ssp. *heliophila*) are the most consistently occurring species.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

DATABASE CODE CEGL000859

MAP UNITS
The ponderosa pine/common juniper community is one of the types included in map units 45 and 48, ponderosa pine woodland complex I and II, on the Wind Cave vegetation map. It is not mapped separately. Stands of dense young doghair are mapped as 49, young ponderosa pine dense cover complex.

COMMENTS
Wind Cave National Park
Ponderosa pine/common juniper appears to have become established where lack of disturbance has allowed dense pine canopy to develop. The ponderosa pine/common juniper type grades into the ponderosa pine/chokecherry type. Some stands were found that included significant amounts of both common juniper and chokecherry, making classification difficult. Dense stands of young pine are occasionally present. These young doghair stands are mapped separately on the Wind Cave vegetation map.

Ponderosa pine/common juniper vegetation is uncommon at Wind Cave NP, and only a few stands were surveyed.

REFERENCES
Hansen, P.L., and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A habitat type classification. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station Gen. Tech. Rep. RM-157. Fort Collins, CO. 68 p.

Hansen, P.L. 1985. An ecological study of the vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest. Unpublished dissertation, South Dakota State University. 257 pp.

Hoffman, G.R. and R.R. Alexander. 1976. Forest vegetation of the Bighorn Mountains, Wyoming: A habitat type classification. Research Paper RM-170. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, fort collins, CO. 38 p.

Hoffman, G.R. and R.R. Alexander. 1987. Forest Vegetation of the Black Hills National Forest of South Dakota and Wyoming: A Habitat Type Classification. USDA Forest Service Research Paper RM-276. Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO. 48 pp.

Johnston, B.C. 1987. Plant associations of region two: potential plant communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas. R2-ECOL-87-2. USDA Forest Service, Rocky Mt. Reg. Lakewood, CO. 429 p.

Jones, G. 1992. Wyoming plant community classification (Draft). Wyoming Natural Diversity Database, Laramie, WY. 183 pp.

Lynn, R., M. Larson, D. Hoeft, L. Todd, T. Raetz, L. Fager, and G. Barranco. No Date. Black Hills National Forest ecological land units study. USDA Forest Service, Black Hills National Forest.

McAdams, A.G., D.A. Stutzman, and D. Faber-Langendoen. 1998. Black Hills Community Inventory, unpublished data. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.

Terwilliger, C., K. Hess and C. Wasser. 1979. Key to the preliminary habitat types of Region 2. Addendum to initial progress report for habitat type classification. Rocky Mountain Forest and Range Experiment Station, Fort Collins.

Thilenius, J.F. 1970. An isolated occurrence of limber pine (Pinus flexilis James) in the Black Hill of South Dakota. Am. Midl. Nat. 84(2):411-417.

Thilenius, J.F. 1971. Vascular plants of the Black Hills of South Dakota and adjacent Wyoming. USDA Forest Service Research Paper RM-71. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Thilenius, J.F. 1972. Classification of the deer habitat in the ponderosa pine forest of the Black Hills, South Dakota. USDA Forest Service Research Paper RM-91. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 28 pp.

Pinus ponderosa / Pascopyrum smithii Woodland

COMMON NAME	Ponderosa Pine / Western Wheatgrass Woodland
SYNONYM	Ponderosa Pine/Western Wheatgrass Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a)
ALLIANCE	*Pinus ponderosa* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is found in Wyoming and South Dakota.

Wind Cave National Park

Ponderosa pine/western wheatgrass is a very common vegetation type at Wind Cave NP. It occupies large areas in the western half of the Park and on Boland Ridge. Smaller scattered stands are found elsewhere.

ENVIRONMENTAL DESCRIPTION

Globally

This type is best developed on gentle to moderately steep slopes of all aspects except south. On northerly aspects, and in stands with greater tree cover, the more mesophytic graminoids have greater cover. Drier sites may contain a more xerophytic mix of species.

Wind Cave National Park

Ponderosa pine/western wheatgrass stands are best developed on gentle to moderately steep slopes of all aspects except south. On northerly aspects, and in stands with greater tree cover, the more mesophytic graminoids have greater cover, such as porcupine grass (*Stipa spartea*), green needlegrass (*Nassella viridula*), Canada wildrye (*Elymus canadensis*), marsh muhly (*Muhlenbergia racemosa*) and prairie dropseed (*Sporobolus heterolepis*). Western wheatgrass, little bluestem (*Schizachyrium scoparium*), sunsedge (*Carex inops* ssp. *heliophila*) and needle-and-thread (*Stipa comata*) are the common dominants on drier sites.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Tree canopy	*Pinus ponderosa*
Herbaceous	*Elymus canadensis, Nassella viridula, Pascopyrum smithii, Stipa comata*

Wind Cave National Park

Stratum	Species
Tree canopy	*Pinus ponderosa*
Herbaceous	*Elymus canadensis, Nassella viridula, Oryzopsis micrantha, Pascopyrum smithii, Stipa comata*

CHARACTERISTIC SPECIES

Globally

Pascopyrum smithii, Pinus ponderosa, Stipa comata

Wind Cave National Park

Pascopyrum smithii, Pinus ponderosa

VEGETATION DESCRIPTION

Globally

Stands are characterized by a somewhat-open canopy of *Pinus ponderosa*, with coverage in the 25 - 50% range. A subcanopy of smaller pines may be present. The shrub stratum is usually sparse, with *Amorpha canescens, Artemisia frigida, Rhus trilobata* and

Toxicodendron pubescens the most frequently found species. Herbaceous cover is typically greater than 75% and graminoid-dominated. Species composition is quite variable. On northerly aspects, and in stands with greater tree cover, the more mesophytic graminoids have greater cover, such as *Stipa spartea, Nassella viridula, Elymus canadensis, Muhlenbergia racemosa* and *Sporobolus heterolepis. Pascopyrum smithii, Schizachyrium scoparium, Carex inops* ssp. *heliophila*, and *Stipa comata* are the common dominants on drier sites. *Oryzopsis micrantha* is dominant at some sites (Marriot personal communication 1999).

Wind Cave National Park
Stands of ponderosa pine/western wheatgrass are characterized by a somewhat-open canopy of ponderosa pine (*Pinus ponderosa*), with coverage in the 25 - 50% range. A subcanopy of smaller pines may be present. The shrub stratum is usually sparse, with downy indigobush (*Amorpha canescens*), prairie sagebrush (*Artemisia frigida*), squaw-bush (*Rhus trilobata*) and poison ivy (*Toxicodendron pubescens*) the most frequently found species. Herbaceous cover is typically greater than 75% and graminoid-dominated. Species composition is quite variable. On northerly aspects, and in stands with greater tree cover, the more mesophytic graminoids have greater cover, such as porcupine grass (*Stipa spartea*), green needlegrass (*Nassella viridula*), Canada wildrye (*Elymus canadensis*), marsh muhly (*Muhlenbergia racemosa*) and prairie dropseed (*Sporobolus heterolepis*). Western wheatgrass, little bluestem (*Schizachyrium scoparium*), sunsedge (*Carex inops* ssp. *heliophila*) and needle-and-thread (*Stipa comata*) are the common dominants on drier sites. Little mountain-ricegrass (*Oryzopsis micrantha*) is dominant at some sites.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

DATABASE CODE CEGL000188

MAP UNITS
The ponderosa pine/western wheatgrass community is one of the types included in map units 45 and 48, ponderosa pine woodland complex I and II, on the Wind Cave vegetation map. It is not mapped separately. Stands of dense young doghair are mapped as 49, young ponderosa pine dense cover complex. Western wheatgrass and Kentucky bluegrass types with standing dead trees and few or no living trees corresponds to map unit 13, Western wheatgrass - Kentucky bluegrass complex (with burned ponderosa pine).

COMMENTS
Wind Cave National Park
This type grades into both ponderosa pine/sunsedge and ponderosa pine/little bluestem types. Some stands are difficult to classify. Dense stands of young pine are occasionally present. These young doghair stands are mapped separately on the Wind Cave vegetation map. Grasslands with standing dead trees (usually burned) and scattered or no living trees are classified as the appropriate grassland type, but are mapped as a burned type on the Wind Cave vegetation map.

Much of Wind Cave NP is vegetated with the ponderosa pine/western wheatgrass community, and many stands were surveyed in preparing the vegetation map.

Graminoid dominance in the herbaceous stratum changes somewhat through the season with warm season grasses such as big bluestem (*Andropogon gerardii*) and prairie dropseed (*Sporobolus heterolepis*) becoming more dominant late in the season. Sunsedge (*Carex inops* ssp. *heliophila*) is more prominent early in the season.

REFERENCES
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Pinus ponderosa / Schizachyrium scoparium Woodland

COMMON NAME	Ponderosa Pine / Little Bluestem Woodland
SYNONYM	Ponderosa Pine/Little Bluestem Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a)
ALLIANCE	*Pinus ponderosa* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in Wyoming, Nebraska, South Dakota, and Montana; it may also occur in Oklahoma, Colorado, and New Mexico.

Wind Cave National Park

Ponderosa pine/little bluestem is a very common vegetation type at Wind Cave NP. It occupies large areas in the western half of the Park and on Boland Ridge, and smaller scattered stands are found elsewhere.

ENVIRONMENTAL DESCRIPTION

Globally

This ponderosa pine / little bluestem community type is a dry woodland found in the Great Plains. It usually occurs on south- and west-facing slopes of hills, rocky breaks, and watercourses.

Wind Cave National Park

Ponderosa pine/little bluestem stands are found on somewhat steep to steep mid- and upper slopes with southerly or westerly aspects.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Tree canopy	*Juniperus scopulorum, Pinus ponderosa*
Short shrub	*Rhus trilobata, Symphoricarpos occidentalis*
Herbaceous	*Schizachyrium scoparium*

Wind Cave National Park

Stratum	Species
Tree canopy	*Pinus ponderosa*
Herbaceous	*Bouteloua curtipendula, Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Globally

Pinus ponderosa, Schizachyrium scoparium

Wind Cave National Park

Pinus ponderosa, Schizachyrium scoparium

VEGETATION DESCRIPTION

Globally

The overstory is dominated by *Pinus ponderosa* with *Juniperus scopulorum* often present. The shrub layer is composed of species such as *Juniperus scopulorum, Rhus trilobata*, and *Symphoricarpos* spp. *Schizachyrium scoparium* is the most abundant graminoid, often accompanied by *Pascopyrum smithii, Bouteloua curtipendula, Bouteloua gracilis, Stipa comata, Carex inops* ssp. *heliophila*, and *Carex foenea*. Common forbs include *Achillea millefolium, Phlox hoodii,* and *Allium* spp.

Wind Cave National Park
Stands of ponderosa pine/little bluestem typically have an open canopy of ponderosa pine, with cover between 10 and 30%. A subcanopy of smaller pines may be present. Shrub cover is sparse, usually less than 10%, with prairie sagebrush (*Artemisia frigida*), downy indigobush (*Amorpha canescens*), squaw-bush (*Rhus trilobata*) and poison ivy (*Toxicodendron pubescens*) the more frequently encountered species. Herbaceous cover most commonly is in the 25-50% range and occasionally greater, with little bluestem and sideoats grama (*Bouteloua curtipendula*) dominant. Other common herbaceous species include white sagebrush (*Artemisia ludoviciana*), western wheatgrass (*Pascopyrum smithii*) and needle-and-thread (*Stipa comata*).

Tree cover is somewhat variable, with dense stands of young pine occasionally present. These young doghair stands are mapped separately on the Wind Cave vegetation map.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3G4. There are probably fewer than 20 occurrences of this community rangewide. It is reported from Nebraska (where it is ranked S?), South Dakota (S?), Wyoming (S2?), and Montana (S2?); it may also occur in Oklahoma, Colorado, and New Mexico. One occurrence is currently documented from Nebraska. Historical acreage and trends are unknown.

DATABASE CODE CEGL000201

MAP UNITS
The ponderosa pine/little bluestem community corresponds to map unit 46, ponderosa pine/little bluestem woodland, on the Wind Cave vegetation map. Stands of dense young doghair are mapped as 49, young ponderosa pine dense cover complex. Little bluestem grassland with standing dead trees and few or no living trees corresponds to map unit 11, little bluestem - grama grass - threadleaf sedge herbaceous vegetation (with burned ponderosa pine).

COMMENTS
Wind Cave National Park
For the Wind Cave NP vegetation classification, *Pinus ponderosa / Schizachyrium scoparium* Wooded Herbaceous Vegetation is included in this type. This type grades into both ponderosa pine/sunsedge and ponderosa pine/western wheatgrass types. Some stands are difficult to classify. Dense stands of young pine are occasionally present. These young doghair stands are mapped separately on the Wind Cave vegetation map. Stands of little bluestem with standing dead trees (usually burned) and scattered or no living trees are classified as little bluestem grassland, but are mapped as a burned type on the Wind Cave vegetation map.

Much of Wind Cave NP is vegetated with the ponderosa pine/little bluestem community, and many stands were surveyed in preparing the vegetation map. Some stands of ponderosa pine/little bluestem are the result of relatively recent pine invasion of little bluestem prairie.

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Pinus ponderosa / Carex inops ssp. heliophila Woodland

COMMON NAME	Ponderosa Pine / Long-stolon Sedge Woodland
SYNONYM	Ponderosa Pine/Sunsedge Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a)
ALLIANCE	*Pinus ponderosa* Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	1
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is found in Montana, Wyoming, western South Dakota, and Colorado.

Wind Cave National Park

The ponderosa pine/sunsedge community is widespread at Wind Cave NP. It is common in the western half of the Park and on Boland Ridge.

ENVIRONMENTAL DESCRIPTION

Globally

This community is often found on gentle and moderate south to west facing slopes (Hansen and Hoffman 1988, Hoffman and Alexander 1987).

Wind Cave National Park

Ponderosa pine/sunsedge stands typically occur on moderate to steep mid- and upper slopes of all aspects.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Tree canopy	*Pinus ponderosa*
Tree sub-canopy	*Juniperus scopulorum, Quercus macrocarpa*
Herbaceous	*Carex inops* ssp. *heliophila*

Wind Cave National Park

Stratum	Species
Tree canopy	*Pinus ponderosa*
Herbaceous	*Carex inops* ssp. *heliophila*

CHARACTERISTIC SPECIES

Globally

Carex inops ssp. *heliophila*

Wind Cave National Park

Carex inops ssp. *heliophila, Pinus ponderosa*

VEGETATION DESCRIPTION

Globally

The tree canopy and subcanopy are dominated by *Pinus ponderosa. Juniperus scopulorum* and *Quercus macrocarpa* are occasionally found in the subcanopy. Shrubs are infrequent in this type. The herbaceous layer is dominated by *Carex inops* ssp. *heliophila*, with inclusions of *Danthonia spicata, Schizachyrium scoparium,* and *Pseudoroegneria spicata* -- generally in areas with more open canopies. At Wind Cave NP, herbaceous cover is most commonly is in the 25-50% range and occasionally greater, with sunsedge dominant. Other common herbaceous species include *Artemisia ludoviciana, Danthonia spicata, Oryzopsis micrantha, Nassella viridula*, and *Poa pratensis* (Marriott personal communication 1999).

Wind Cave National Park

Stands of ponderosa pine/sunsedge typically have an open canopy of ponderosa pine, with cover between 20 and 50%. A subcanopy of smaller pines may be present. Shrub cover is sparse, usually less than 10%, with prairie sagebrush (Artemisia frigida), downy indigobush (Amorpha canescens), squaw-bush (Rhus trilobata) and poison ivy (Toxicodendron pubescens) the more frequently encountered species. Herbaceous cover most commonly is in the 25-50% range and occasionally greater, with sunsedge dominant. Other common herbaceous species include white sagebrush (Artemisia ludoviciana), poverty oatgrass (Danthonia spicata), little mountain-ricegrass (Oryzopsis micrantha), green needlegrass (Nassella viridula) and Kentucky bluegrass (Poa pratensis).

Tree cover is somewhat variable, with dense stands of young pine occasionally present. These young doghair stands are mapped separately on the Wind Cave vegetation map.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

DATABASE CODE CEGL000849

MAP UNITS The ponderosa pine/sunsedge community is one of the types included in map units 45 and 48, ponderosa pine woodland complex I and II, on the Wind Cave vegetation map. It is not mapped separately. Stands of dense young doghair are mapped as 49, young ponderosa pine dense cover complex.

COMMENTS

Wind Cave National Park

This type grades into both ponderosa pine/little bluestem and ponderosa pine/western wheatgrass types. Some stands are difficult to classify. Dense stands of young pine are occasionally present. These young doghair stands are mapped separately on the Wind Cave vegetation map.

The ponderosa pine/sunsedgecommunity is common at Wind Cave NP, and many stands were surveyed in preparing the vegetation map. Sunsedge peaks relatively early in the growing season, often in June. Later in the season its cover decreases, and the cover of other graminoids may increase. What appears to be a ponderosa pine/sunsedge stand in June may become ponderosa pine with other graminoids dominant later in the summer.

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Populus deltoides / Symphoricarpos occidentalis Woodland

COMMON NAME	Eastern Cottonwood / Western Snowberry Woodland
SYNONYM	Cottonwood/Wolfberry - Western Rose Floodplain
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Deciduous woodland (II.B)
PHYSIOGNOMIC GROUP	Cold-deciduous woodland (II.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.B.2.N)
FORMATION	Temporarily flooded cold-deciduous woodland (II.B.2.N.b)
ALLIANCE	*Populus deltoides* Temporarily Flooded Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community occurs in three northern Great Plains ecoregional sections, where it is found in Colorado, Wyoming, North Dakota, and possibly South Dakota.

Wind Cave National Park

Mappable stands of plains cottonwood/western snowberry vegetation occur in drainages east of the Park. These areas are under private ownership, and were not accessible for survey.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found on medium to coarse textured alluvial soils on the floodplains of major rivers. The floodplains are both seasonally inundated and subirrigated (Thilenius et al. 1995). The meandering erosional and depositional pattern of rivers maintains and influences this community along rivers (Hanson 1990). It is rarely found at higher elevations in the mountains of eastern Wyoming and western South Dakota (Johnston 1987).

Wind Cave National Park

Mappable stands of plains cottonwood/western snowberry vegetation occur in drainages east of the Park. These areas are under private ownership, and were not accessible for survey.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Tree canopy	*Populus deltoides*
Short shrub	*Symphoricarpos occidentalis*
Forb	*Maianthemum stellatum, Melilotus officinalis*
Graminoid	*Poa secunda*

Wind Cave National Park

Stratum	Species

Information not available.

CHARACTERISTIC SPECIES

Globally

Populus deltoides, Symphoricarpos occidentalis

Wind Cave National Park

Information not available.

VEGETATION DESCRIPTION

Globally

This community is typically dominated by a single deciduous tree species, *Populus deltoides*. In some stands other species, such as *Acer negundo* and *Fraxinus pennsylvanica,* may contribute to the canopy. The tallest trees exceed 15 meters. *Populus deltoides* is a

pioneer species that requires moist, sparsely vegetated alluvium to become established from seed, therefore stands of this community are seral. The shrub layer is typically 0.5-1 m tall. It is dominated by *Symphoricarpos occidentalis* and commonly includes *Juniperus scopulorum* and *Rosa* spp. In Wyoming, *Chrysothamnus nauseosus* is present and increases with heavy grazing (Thilenius et al. 1995). The herbaceous layer usually includes *Pascopyrum smithii* and *Elymus trachycaulus*. Weedy species such as *Cirsium arvense, Melilotus officinalis, Taraxacum officinale*, and *Poa secunda* are very common, especially in the presence of grazing (Jones and Walford 1995, Thilenius et al. 1995). *Maianthemum stellatum* is abundant only where grazing is absent.

Wind Cave National Park
Mappable stands of plains cottonwood/western snowberry vegetation occur in drainages east of the Park. These areas are under private ownership, and were not accessible for survey. A very small stand is found in a draw between NPS Rds. 5 and 6 in the northeast part of the Park. Isolated cottonwoods occur elsewhere in drainage bottoms in the Park.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2G3. The total number of occurrences is unknown. Thirteen have been documented in North Dakota, where the community is ranked S1S2?. Although no other occurrences have been documented, the community is also reported from Wyoming (S2), Colorado (S2) and may occur in South Dakota (SP). It is found in three northern Great Plains ecoregional sections. The community occurs on medium to coarse textured soils on the floodplains of major rivers.

DATABASE CODE CEGL000660

MAP UNITS
The plains cottonwood/western snowberry community corresponds to map unit 40, plains cottonwood/western snowberry forest, on the Wind Cave vegetation map.

COMMENTS

REFERENCES
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Cercocarpus montanus / Bouteloua curtipendula Shrubland

COMMON NAME	Alderleaf Mountain-mahogany / Sideoats Grama shrubland
SYNONYM	Mountain Mahogany / Side-oats Grama Shrubland
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Temperate cold-deciduous shrubland (III.B.2.N.a)
ALLIANCE	*Cercocarpus montanus* Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found on slopes in the Black Hills of South Dakota and Wyoming and on some of the lower mountain slopes of eastern Wyoming. It is found on slopes below ponderosa pine forests and above herbaceous communities. It has been reported in and around the Wildcat Hills of western Nebraska and in New Mexico. Its disjunct occurrence in New Mexico needs further study.

Wind Cave National Park

Stands of mountain mahogany are best developed in areas of limestone, especially the Minnekahta limestone which underlies the surface immediately west of the Red Valley (west of NPS Rd. 5). Smaller stands occur elsewhere, for example on Boland Ridge.

ENVIRONMENTAL DESCRIPTION

Globally

This community is almost exclusively found on slopes. These slopes are 20-40% with a variety of aspects (Hoffman and Alexander 1987). Drought stress is severe due to relatively little precipitation, moderate to steep slopes, and thin, poorly developed soils. Soils are loams and clay loams. The parent material is sandstone or limestone (Johnston 1987).

Wind Cave National Park

Mountain mahogany/side-oats grama shrublands occur most commonly on somewhat steep to steep slopes of all aspects, and are best developed in areas underlain by limestone. Smaller stands occur in areas of sandstones, such as on Boland Ridge.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Shrub	*Cercocarpus montanus*
Herbaceous	*Bouteloua curtipendula*

Wind Cave National Park

Stratum	Species
Shrub	*Cercocarpus montanus, Rhus trilobata*
Herbaceous	*Bouteloua gracilis, Bouteloua curtipendula, Oryzopsis micrantha, Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Globally

Bouteloua curtipendula, Cercocarpus monanus

Wind Cave National Park

Bouteloua curtipendula, Cercocarpus montanus

VEGETATION DESCRIPTION

Globally

Throughout its range, this community is a shrub-steppe community. Its physiognomy is similar to the chaparral of California. Vegetation cover is sparse to moderate. The dominant shrubs are evenly spaced with herbaceous species occurring in between

individual shrubs. The dominant species, *Cercocarpus montanus*, is approximately 2 meters tall. *Rhus trilobata* var. *trilobata*, the other common shrub species, also grows to 2 meters. The herbaceous species rarely grow taller than 1 meter. *Bouteloua curtipendula* is the most abundant herbaceous species. *Artemesia frigida* is a typical smaller shrub. Common herbaceous species are the forbs *Aristida purpurea, Aster oblongifolius, Hedeoma hispida*, and the grass *Oryzopsis hymenoides.*

Wind Cave National Park
Mountain mahogany/side-oats grama shrublands at Wind Cave NP typically have moderate shrub cover, in the 20-50% range. Structure and species composition of mountain mahogany stands are fairly consistent. Sometimes the shrub component can be split into tall and short strata. Mountain mahogany is strongly dominant; squaw-bush (*Rhus trilobata*) occurs frequently, and is occasionally common. Broom snakeweed (*Gutierrezia sarothrae*) and prairie sagebrush (*Artemisia frigida*) are common short shrubs. Herbaceous cover is variable, ranging from 10 to greater than 75%. Side-oats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), green needlegrass (*Nassella viridula*), little mountain-ricegrass (*Oryzopsis micrantha*) and little bluestem (*Schizachyrium scoparium*) occur frequently.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G5

DATABASE CODE CEGL001086

MAP UNITS
The mountain mahogany/side-oats grama community corresponds to map units 30 and 31, mountain mahogany / side-oats grama shrublands I and II, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
A few mountain mahogany stands were found with a significant ponderosa pine component, making classification difficult. Mountain mahogany/side-oats grama shrubland is limited in extend, and many of the stands were visited during preparation of the vegetation map.

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Prunus virginiana Shrubland

COMMON NAME	Choke Cherry Shrubland
SYNONYM	Chokecherry Shrubland
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Temperate cold-deciduous shrubland (III.B.2.N.a)
ALLIANCE	*Prunus virginiana* Shrubland Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This association is found in Washington, Oregon, Idaho, Montana, Wyoming, western South Dakota, Colorado, and possibly Nevada.

Wind Cave National Park

Chokecherry shrublands are found throughout Wind Cave NP. Exemplary stands can be found in the bottoms and heads of draws in the prairie areas of the northeast part of the Park. Slopes with large stands of mixed shrubs in grassland can be found on the east side of Boland Ridge.

ENVIRONMENTAL DESCRIPTION

Globally

This association grows at the interface between the riparian areas and the adjacent upland. It usually occurs as small pockets on higher terraces or as narrow bands along the high water mark of steep banks and incised channels. It can also grow at the base of cliffs adjacent to rivers and streams where it forms impenetrable thickets.

Wind Cave National Park

Chokecherry shrubland is found in a variety of habitats. Slope varies from flat to very steep, with variable aspect. Stands are commonly found in the bottoms of draws and drainages. This type also occurs associated with rock outcrops. Some stands on slopes are the result of recent fire that killed the overlying canopy, converting ponderosa pine/chokecherry forest to chokecherry shrubland.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Shrub	*Prunus virginiana*

Wind Cave National Park

Stratum	Species
Shrub	*Amorpha canescens, Prunus virginiana, Rhus trilobata, Symphoricarpos occidentalis, Toxicodendron pubescens*

CHARACTERISTIC SPECIES

Globally

Prunus virginiana

Wind Cave National Park

Prunus virginiana

VEGETATION DESCRIPTION

Globally

The *Prunus virginiana* association is a medium-height (4-6 feet, 1.5-2 m) shrubland with dense vegetation which is almost impossible to walk through. Prunus virginiana is the most abundant shrub. Further review of the global type is necessary.

Wind Cave National Park
Chokecherry shrubland at Wind Cave NP is characterized by moderate to dense shrub cover, typically in the 25-75% range. Shrub cover is generally greater in drainage bottoms and on lowermost slopes, and less on slopes. Chokecherry may be the dominant shrub species, but often other species are codominant or dominant, especially on slopes, including squaw-bush (*Rhus trilobata*), downy indigo-bush (*Amorpha canescens*), western snowberry (*Symphoricarpos occidentalis*) and poison ivy (*Toxicodendron pubescens*). In drainage bottom situations, herbaceous cover is usually sparse, less than 10%. On slopes, the shrubs typically occur in some grassland type, and graminoid cover can be greater than 75%.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4Q

DATABASE CODE CEGL001108

MAP UNITS
The chokecherry shrubland community corresponds to map unit 33, chokecherry shrubland, on the Wind Cave vegetation map. Chokecherry shrubland with standing dead trees and few or no living trees corresponds to map unit 12, chokecherry shrubland (with burned ponderosa pine).

COMMENTS
Wind Cave National Park
Chokecherry shrubland occurs as small stands in drainage bottoms. The stands of mixed shrubs on slopes can be somewhat larger. The chokecherry shrubland type frequently grades into the western snowberry shrubland type, and some stands are difficult to classify. On slopes, chokecherry may be uncommon or even absent; squaw-bush (*Rhus trilobata*) may be the dominant shrub in these situations. Chokecherry shrubland is a fairly common type at Wind Cave NP. Many stands were visited in preparing the vegetation map, as the type is variable and somewhat difficult to characterize.

Chokecherry shrublands on slopes are generally surrounded by grassland types. In drainage bottoms, stands are often adjacent to western snowberry shrubland, and the two types grade into each other. Chokecherry shrublands may also occur as inclusions in ponderosa pine types, as a result of fire and pine mortality.

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Salix bebbiana Shrubland

COMMON NAME	Gray Willow Shrubland
SYNONYM	Beaked Willow Scrub
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Temporarily flooded cold-deciduous shrubland (III.B.2.N.d)
ALLIANCE	*Salix bebbiana* Temporarily Flooded Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This community has been identified in the Black Hills of South Dakota and Wyoming. It also appears in Montana.

Wind Cave National Park

Bebb's willow shrubland does not occur in Wind Cave NP. It is found along streams in the area west of the Park.

ENVIRONMENTAL DESCRIPTION

Globally

This community is a briefly flooded scrub-shrub wetland on slightly to moderately alkaline soils, usually near low-gradient streams. The water table is well below the soil surface for over half the growing season. However, there are brief periods of several days to a few weeks when water is at the surface.

Wind Cave National Park

Bebb's willow shrubland occurs in narrow zones along streams in the Wind Cave NP area.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Shrub	*Salix bebbiana*
Herbaceous	*Carex* spp., *Scirpus* spp.

Wind Cave National Park

Stratum	Species
Shrub	*Salix bebbiana*

CHARACTERISTIC SPECIES

Globally

Salix bebbiana

Wind Cave National Park

Salix bebbiana

VEGETATION DESCRIPTION

Globally

This shrubland is typically dominated by a dense growth of shrubs 0.5-3 m tall. The most abundant species in the shrub layer are *Salix bebbiana, Salix scouleriana*, and *Salix fendleriana*. Other species found in this strata include *Betula occidentalis, Cornus sericea* ssp. sericea, *Salix exigua, Salix fluviatilis*, and *Prunus virginiana*. Multiple-stemmed trees and/or shrubs 1.5-5 m tall have 30-100% cover; single-stemmed trees have less than 30% cover. The herbaceous layer often contains *Scirpus* spp., *Carex* spp., *Triglochin palustris, Calamagrostis canadensis*, and *Equisetum* spp. along the wetter margins of the community. In the drier areas *Gentiana strictiflora, Prunella vulgaris, Pyrola asarifolia, Zizia cordata, Sanicula marilandica, Viola canadensis, Vicia americana*, and *Ranunculus macounii* are frequently present.

Wind Cave National Park
Bebb's Willow Shrubland is strongly dominated by Bebb's willow, with cover in the 50-75% range and sometimes greater. In the Wind Cave area, other shrubs that contribute minor cover are juneberry (*Amelanchier alnifolia*) and several species of currant (*Ribes* spp.). Herbaceous cover is sparse overall, but patches of western Great Plains streamside vegetation can be found in openings in the willows.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?. Most sites have been impacted by grazing.

DATABASE CODE CEGL001173

MAP UNITS
The Bebb's willow community corresponds to map unit 34, Bebb Willow Shrubland, on the Wind Cave vegetation map.

COMMENTS

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Symphoricarpos occidentalis Shrubland

COMMON NAME	Western Snowberry Shrubland
SYNONYM	Wolfberry Shrubland
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Temporarily flooded cold-deciduous shrubland (III.B.2.N.d)
ALLIANCE	*Symphoricarpos occidentalis* Temporarily Flooded Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is widespread in western Montana and North Dakota. It is also present in South Dakota, Nebraska, Wyoming, and Saskatchewan.

Wind Cave National Park

Stands of western snowberry are found throughout Wind Cave NP, in both forested and prairie areas.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found in mesic swales, depressions, ravines and floodplains. Some examples of this community experience intermittent and brief flooding. The soils are fertile and well drained to imperfectly drained silts and loams. The upper soil horizon is usually deep, although a thin layer of sand may be present if the site has been recently flooded (Jones 1995).

Wind Cave National Park

Western snowberry shrublands occur most commonly on level sites in the bottoms of draws, drainages and swales in both forested and prairie areas. Stands of western snowberry are found occasionally on gentle to moderate slopes of various aspects.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Shrub	*Symphoricarpos occidentalis*
Herbaceous	*Artemisia ludovicianan, Pascopyrum smithii*

Wind Cave National Park

Stratum	Species
Shrub	*Symphoricarpos occidentalis*
Herbaceous	*Artemisia ludoviciana, Nassella viridula, Poa pratensis*

CHARACTERISTIC SPECIES

Globally

Pascopyrum smithii, Symphoricarpos occidentalis

Wind Cave National Park

Nassella viridula, Poa pratensis, Symphoricarpos occidentalis

VEGETATION DESCRIPTION

Globally

Throughout its range this community is dominated by shrubs approximately 1 m tall. Shrub cover is typically greater than 50%. In places it can approach 100%. These shrubs form dense clumps that exclude most other species. *Symphoricarpos occidentalis* is the most common shrub, but *Rhus aromatica* (or *Rhus trilobata*) and *Prunus virginiana* can be locally abundant and can grow to 2-3 meters in places. Herbaceous species and smaller shrubs are most abundant at the edge of this community and in gaps between the clumps of taller shrubs where the shading is less complete. *Rosa woodsii* is a typical smaller shrub. *Achillea millefolium, Artemisia*

ludoviciana, Galium boreale, and *Pascopyrum smithii* are common herbaceous species of this community. Woody vines sometimes occur, including *Parthenocissus vitacea*.

The *Symphoricarpos occidentalis* shrubland type occurs as thickets thoughout its range. These thickets are surrounded by grasslans or occasionally tall shrublands (e.g., *Prunus virginana*)

Wind Cave National Park
Western snowberry shrublands at Wind Cave NP typically have dense shrub cover, in the 75-100% range. Western snowberry usually is strongly dominant, but occasionally other shrubs are codominant, including chokecherry (*Prunus virginiana*), downy indigobush (*Amorpha canescens*) and poison ivy (*Toxicodendron pubescens*). Herbaceous cover is sparse; green needlegrass (*Nassella viridula*), Kentucky bluegrass (*Poa pratensis*) and white sagebrush (*Artemisia ludoviciana*) occur frequently. Occasionally, herbaceous cover may be dense, with forbs such wild bergamot bee-balm (*Mondarda fistulosa*) or wild licorice (*Glycyrrhiza lepitoda*) overtopping the shrubs.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4G5

DATABASE CODE CEGL001131

MAP UNITS
The western snowberry community corresponds to map unit 35, western snowberry shrubland, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
The western snowberry type occasionally grades into chokecherry shrubland, and some stands are difficult to classify. Western snowberry shrubland is a common vegetation type at Wind Cave NP. Relatively few stands were visited during preparation of the vegetation map, as structure and composition of stands is quite consistent.

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Juniperus horizontalis / Schizachyrium scoparium Dwarf-shrubland

COMMON NAME	Creeping Juniper / Little Bluestem Dwarf-shrubland
SYNONYM	Creeping Juniper / Little Bluestem Dwarf- shrubland
PHYSIOGNOMIC CLASS	Dwarf-shrubland (IV)
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland (IV.A)
PHYSIOGNOMIC GROUP	Needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (IV.A.1.N)
FORMATION	Creeping or matted needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1.N.b)
ALLIANCE	*Juniperus horizontalis* Dwarf-Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in South Dakota, North Dakota, southeast, central, and northeastern Montana, and southern Manitoba. Further details of its distribution within these states and province are not available.

Wind Cave National Park

Creeping juniper vegetation is rare at Wind Cave NP. It was found only in the Red Valley roughly east of the junction of NPS Rds. 5 and 6.

ENVIRONMENTAL DESCRIPTION

Globally

This association is found on silty loam, sandy loam, or clay loam soil and occurs on moderate to steep slopes, usually on upper slopes. In North Dakota, Montana, and South Dakota it is on north- and, rarely, west-facing slopes. In Manitoba it is thought to occur on dry south-facing slopes. Parent materials are sandstone, siltstone, claystone, and sandy glacial till.

Wind Cave National Park

Creeping juniper/little bluestem dwarf shrubland was found only in the Red Valley on sites underlain by the Spearfish Formation. Stands were found on mid to upper moderate to somewhat steep slopes with easterly aspects.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Dwarf-shrub	*Juniperus horizontalis*
Herbaceous	*Carex filifolia, Carex inops* ssp. *heliophila, Koeleria macrantha, Schizachyrium scoparium*

Wind Cave National Park

Stratum	Species
Dwarf-shrub	*Juniperus horizontalis*
Herbaceous	*Andropogon gerardii, Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Globally

Juniperus horizontalis, Schizachyrium scoparium

Wind Cave National Park

Juniperus horizontalis, Schizachyrium scoparium

VEGETATION DESCRIPTION

Globally

This community is dominated by short shrubs and graminoids. Vegetation cover is moderate to high. The dominant species is usually *Juniperus horizontalis*, a mat forming shrub. Other low shrubs include *Artemisia frigida, Potentilla fruticosa, Symphoricarpos*

occidentalis, and *Rosa arkansana*. *Rhus trilobata* and *Prunus virginiana* are taller shrubs that may be present. The most abundant graminoid is *Schizachyrium scoparium*. Other common graminoids include *Calamovilfa longifolia, Carex filifolia, C. inops* ssp. *heliophila, C. eleocharis, Koeleria macrantha*, and *Muhlenbergia cuspidata*. Some of the forbs that are associated with this community are *Anemone patens, Campanula rotundifolia, Comandra umbellata, Echinacea angustifolia, Dalea purpurea, Galium boreale, Senecio plattensis*, and *Linum perenne*.

Wind Cave National Park
Stands of creeping juniper/little bluestem are characterized by moderate shrub cover, in the 25-50% range, with creeping juniper strongly dominant. Sand cherry (*Prunus pumila*) and broom snakeweed (*Gutierrezia sarothrae*) are often present but sparse. Herbaceous cover was highly variable in the stands visited, ranging from 15 to 60%. Little bluestem (*Schizachyrium scoparium*) and big bluestem (*Andropogon gerardii*) contributed the greatest cover. On the less vegetated sites, a much greater diversity of forbs was found.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4

DATABASE CODE CEGL001394

MAP UNITS
The creeping juniper/little bluestem community corresponds to map unit 36, creeping juniper/little bluestem dwarf shrubland, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
The stands of creeping juniper found at Wind Cave NP are small, less than 0.5 ha in size and usually surrounded by little bluestem prairie. Creeping juniper vegetation is rare at Wind Cave NP, and so only a few stands were visited.

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Andropogon gerardii - Schizachyrium scoparium Western Great Plains Herbaceous Vegetation

COMMON NAME	Big Bluestem - Little Bluestem Western Great Plains Herbaceous Vegetation
SYNONYM	Western Bluestem Tallgrass Prairie
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Tall sod temperate grassland (V.A.5.N.a)
ALLIANCE	*Andropogon gerardii - (Sorghastrum nutans)* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

The *Andropogon gerardii - Schizachyrium scoparium* Western Great Plains Herbaceous Vegetation association occurs along the eastern foothills of the Rocky Mountains in Colorado and on basalt outcrops in the southeastern portion of the state (CNHP 1997). Johnston (1987) indicates that this association also occurs in Montana, Nebraska, Kansas, and the Dakotas, but Colorado Natural Heritage Program ecologists believe these occurrences outside of Colorado differ from the Colorado element because the association structure differs and they lack midwestern species.

Wind Cave National Park

Big bluestem - little bluestem grassland is common on slopes in the eastern half of Wind Cave NP. Exemplary stands can be found on the west side of Boland Ridge, and on the slopes of the broad flat ridges found along the eastern half of the north Park boundary.

ENVIRONMENTAL DESCRIPTION

Globally

This community occurs in nearly level to gently sloping (0-20% slope), park-like openings in ponderosa pine forests at 3,700-4,100 ft elevation. Most stands occurred on east or north aspects. Mean annual precipitation is 38-48 cm. Soils are loamy: clay loam, sandy loam and sandy clay loam (Taylor and Holst 1976). Parent materials are sandstone, siltstone, and claystone (Veseth and Montagne 1980).

Wind Cave National Park

Big bluestem - little bluestem grassland occurs on somewhat steep to steep slopes that are often rocky. Aspect varies.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Herbaceous	*Andropogon gerardii, Bouteloua curtipendula, Calamovilfa longifolia, Carex inops* ssp. *heliophila, Festuca idahoensis, Schizachyrium scoparium*

Wind Cave National Park

Stratum	Species
Herbaceous	*Andropogon gerardii, Bouteloua curtipendula*

CHARACTERISTIC SPECIES

Globally

Andropogon gerardii, Schizachyrium scoparium

Wind Cave National Park

Andropogon gerardii, Schizachyrium scoparium

VEGETATION DESCRIPTION

Globally

Stands are dominated by the tall grasses *Andropogon gerardii* and *Schizachyrium scoparium*. *Calamovilfa longifolia* may be common on more coarse-textured soils, whereas *Festuca idahoensis* may be common in mesic stands. *Bouteloua curtipendula* and *Carex inops* ssp. *heliophila* are other important graminoids. Common forbs include *Psoralea argophylla* and *Artemisia ludoviciana*. *Gutierrezia sarothrae* is a common dwarf shrub (Taylor and Holst 1976, Culwell and Skow 1981, Culwell and Skow 1982, Pase and Thelinius 1968). At Wind Cave NP in South Dakota, this grassland type is dominated by *Andropogon gerardii*. Species distribution is patchy, with big bluestem often occupying large areas to the exclusion of other species. *Bouteloua curtipendula* may be codominant and *Schizachyrium scoparium* cover is sparse to absent (H. Marriott personal communication 1999).

Wind Cave National Park
Stands of big bluestem - little bluestem have moderate to dense herbaceous cover, typically in the 50 - 75% range, and often greater. This grassland type is dominated by big bluestem (*Andropogon gerardii*). Species distribution is patchy, with big bluestem often occupying large areas to the exclusion of other species. Side-oats grama (*Bouteloua curtipendula*) may be codominant. Little bluestem (*Schizachyrium scoparium*) cover is sparse, or the species may be absent altogether. Big bluestem cover typically increases though the growing season, but there may be little vegetative production and no flowering stems in extremely dry years. Big bluestem can be a late season dominant in other grassland types at Wind Cave NP also.

Big bluestem is a warm-season grass, becoming more dominant late in the growing season. Cover varies greatly with seasonal conditions, with abundant late season moisture being quite favorable. At Wind Cave NP, little bluestem maybe be sparse or absent stands of this type, and side-oats grama (*Bouteloua curtipendula*) is often abundant.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G2. The *Andropogon gerardii - Schizachyrium scoparium* association is a regional endemic that occurs along the eastern foothills of the Rocky Mountains in Colorado and on basalt outcrops in the southeastern portion of the state (CO NHP 1997). There are twenty documented occurrences of this association. Of these occurrences, none is ranked A, five are ranked B, and forty percent are not considered viable (ranked D or H). The region in which this association is found (Colorado's Front Range and southeast Colorado) have been surveyed to a large extent by the Colorado Natural Heritage Program, so few if any additional high-quality occurrences can be expected. This association is known from about 4000 acres. Over half this amount is contained within one occurrence. Given that a vast area where this association may have formerly occurred has been developed, converted to agricultural use, or invaded by weedy species, it can be confidently assumed that this association occurs in less than ten percent of its former habitat. This association remains very threatened by development along the Front Range, gravel mining operations (e.g., near Rocky Flats), and invasion by woody species in response to a lack of fire.

DATABASE CODE CEGL001463

MAP UNITS
Big bluestem was found in many habitats and vegetation types, but only stands dominated by big bluestem with little bluestem and/or side-oats grama were recognized as a big bluestem plant community. The big bluestem - little bluestem community is one of the types included in map unit 16, western wheatgrass - Kentucky bluegrass complex, on the Wind Cave vegetation map. It is not mapped separately.

COMMENTS
Wind Cave National Park
Patches of big bluestem can occur in little bluestem grasslands. However, the habitat of the big bluestem - little bluestem community differs. This type typically occurs on steeper, rocky slopes. In addition, big bluestem is strongly dominant, and little bluestem is often uncommon or even absent. Side-oats grama is often codominant.

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Pascopyrum smithii - Nassella viridula Herbaceous Vegetation

COMMON NAME	Western Wheatgrass - Green Needlegrass Herbaceous Vegetation
SYNONYM	Western Wheatgrass - Green Needlegrass Mixedgrass Prairie
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Medium-tall sod temperate or subpolar grassland (V.A.5.N.c)
ALLIANCE	*Pascopyrum smithii* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in Wyoming, Montana, Saskatchewan, Manitoba, North Dakota, and South Dakota. Details of its distribution within these states and provinces are not available.

Wind Cave National Park

Extensive areas of western wheatgrass - green needlegrass vegetation can be found in the eastern half and southwest quarter of the Park, which are predominantly grassland. In these areas, western wheatgrass - green needlegrass often occurs with Kentucky bluegrass and little bluestem vegetation. The little bluestem community typically occurs on steeper slopes, with Kentucky bluegrass and western wheatgrass vegetation on gentler slopes and in swales. Stands also occur in other areas of the Park in openings in forests and woodlands.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found at the bottom of narrow valleys, on stream terraces, and on rolling uplands (Jones 1992, USFS 1992). The soils are usually sandy loams, silt loams, or clay loams. Soil profile is typically well developed. The parent material is siltsone and mixed sedimentary rock (USFS 1992). This community usually occurs on level or nearly level ground but sometimes may be on moderate slopes of any aspect.

Wind Cave National Park

Western wheatgrass - green needlegrass stands occur in a wide variety of habitats throughout the Park. Sites generally are flat to moderate in slope, and are found on all aspects.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Herbaceous	*Nassella viridula, Pascopyrum smithii*

Wind Cave National Park

Stratum	Species
Herbaceous	*Pascopyrum smithii, Poa pratensis, Nassella viridula, Stipa comata*

CHARACTERISTIC SPECIES

Globally

Nassella viridula, Pascopyrum smithii

Wind Cave National Park

Nassella viridula, Pascopyrum smithii

VEGETATION DESCRIPTION

Globally

This community is dominated by mid grasses. The vegetation cover tends to be moderate to high, with almost all of the canopy provided by graminoids (Redmann 1975, USFS 1992). The dominant species are *Pascopyrum smithii* and *Nassella viridula*, both of

which attain heights of 0.6-1.0 m, Other mid grasses in this community are *Stipa comata, Koeleria macrantha, Poa* spp., *Sporobolus cryptandrus*, and, on sandier soils, *Calamovilfa longifolia*. Shorter graminoids are common, including *Bouteloua gracilis, Carex eleocharis, Carex filifolia,* and *Carex inops* ssp. *heliophila*. Where it is present within the range of this community, *Carex pensylvanica* may be abundant (Redmann 1975). The forbs *Astragalus* spp., *Achillea millefolium, Sphaeralcea coccinnea, Artemisia ludoviciana*, and *Lepidium densiflorum* are also typical of this community. *Artemisia frigida* is the only shrub that is usually present, although Johnston (1987) reported that tree size *Juniperus scopulorum* may also be present.

Wind Cave National Park
Stands of western wheatgrass - green needlegrass typically have moderate to dense herbaceous cover, ranging from 50 to 100%. Dominant graminoids include western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), needle-and-thread (*Stipa comata*) and Kentucky bluegrass (*Poa pratensis*). Species dominance varies locally within a stand. Other common herbaceous species include white sagebrush (*Artemisia ludoviciana*), scurf-pea (*Psoralidium tenuiflorum*) and naked-spike ambrosia (*Ambrosia psilostachya*). Big bluestem (*Andropogon gerardii*) may be present, with high coverage in wetter seasons. On steeper slopes, it is not uncommon to find significant amounts of downy indigo-bush(*Amorpha canescens*), with cover greater than 20%. These shrub stands are recognized as a separate map unit for the Wind Cave vegetation map.

In stands of western wheatgrass - green needlegrass at Wind Cave NP, species dominance varies within the stand. Western wheatgrass, green needlegrass, needle-and-thread (*Stipa comata*) and Kentucky bluegrass (*Poa pratensis*) all can be locally dominant, often to the exclusion of other species. For this reason, it is important to sample multiple points in characterizing a stand of this type.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4. The G4 rank is based on the broad geographic distribution and the relatively broad environmental requirements of this association. The prevalence of cheatgrass in many stands, though, may necessitate a review of this rank.

DATABASE CODE CEGL001583

MAP UNITS
The western wheatgrass - green needlegrass community is one of the types included in map unit 16, western wheatgrass - Kentucky bluegrass complex, on the Wind Cave vegetation map. It is not mapped separately. Western wheatgrass - green needlegrass stands with standing dead trees and few or no living trees corresponds to map unit 13, western wheatgrass - Kentucky bluegrass complex (with burned ponderosa pine). Western wheatgrass - green needlegrass stands with leadplant cover greater than 20% are mapped separately as map unit 32, lead plant shrubland.

COMMENTS
Wind Cave National Park
The western wheatgrass - green needlegrass type grades into the Kentucky bluegrass type, and some stands are difficult to classify. Western wheatgrass - green needlegrass often forms a mosaic with Kentucky bluegrass and little bluestem vegetation. The little bluestem community typically occurs on steeper slopes, with Kentucky bluegrass and western wheatgrass vegetation on gentler slopes and in swales. Big bluestem may be present in stands of western wheatgrass - green needlegrass. In favorable years, big bluestem will contribute significant cover during the later part of the growing season.

Western wheatgrass - green needlegrass herbaceous vegetation is very common. Many stands were visited in preparing the vegetation map. Extensive areas of western wheatgrass - green needlegrass vegetation can be found in the eastern half and southwest quarter of the Park, which are predominantly grassland. Smaller stands occur in other areas of the Park in openings in forests and woodlands.

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Schizachyrium scoparium - Bouteloua (curtipendula, gracilis) - Carex filifolia Herbaceous Vegetation

COMMON NAME	Little Bluestem - (Sideoats Grama, Blue Grama) / Threadleaf Sedge Herbaceous Vegetation
SYNONYM	Northern Great Plains Little Bluestem Prairie
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Medium-tall sod temperate or subpolar grassland (V.A.5.N.c)
ALLIANCE	*Schizachyrium scoparium* - *Bouteloua curtipendula* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in western North Dakota, western South Dakota, eastern and northern Wyoming, central and eastern Montana, southern Saskatchewan, and southern Manitoba.

Wind Cave National Park

Extensive areas of little bluestem vegetation can be found in the eastern half and southwest quarter of the Park, which are predominantly grassland. In these areas, little bluestem often occurs with western wheatgrass and Kentucky bluegrass vegetation. The little bluestem community typically occurs on steeper slopes, with Kentucky bluegrass and western wheatgrass vegetation on gentler slopes and in swales. Stands also occur in other areas of the Park in openings in forests and woodlands.

ENVIRONMENTAL DESCRIPTION

Globally

This community is usually found on moderate to steep slopes with variable aspects. The soils are typically shallow and occur over sandstone or limestone.

Wind Cave National Park

Little bluestem stands occur on slopes of variable steepness and aspect, as well as on on level sites. However, sites generally are drier, steeper and/or have poorer soils than sites that support Kentucky bluegrass and western wheatgrass - green needlegrass vegetation types.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Herbaceous	*Schizachyrium scoparium*

Wind Cave National Park

Stratum	Species
Herbaceous	*Bouteloua curtipendula, Schizachyrium scoparium*

CHARACTERISTIC SPECIES

Globally

Bouteloua curtipendula, Bouteloua gracilis, Carex inops ssp. *heliophila, Schizachyrium scoparium*

Wind Cave National Park

Bouteloua curtipendula, Carex inops ssp. *heliophila, Schizachyrium scoparium*

VEGETATION DESCRIPTION

Globally

The vegetation is predominantly composed of graminoid species less than 1 m tall with moderate to high cover. The dominant species is *Schizachyrium scoparium* with *Bouteloua curtipendula, B. gracilis*, and *Carex filifolia* as associates or codominants. *Andropogon*

gerardii, Carex inops ssp. *heliophila, C. eleocharis, Koeleria macrantha* and *Calamovilfa longifolia* are often present. *C. longifolia* may be abundant on sandier soils. *Muhlenbergia cuspidata, Stipa comata, Pascopyrum smithii*, and *Nassella viridula* may also be present. Forbs do not contribute greatly to the canopy, but many species may be found in this community. Among the forbs that may be found are *Echinacea angustifolia, Aster oblongifolius, Gaura coccinea, Lygodesmia juncea, Helianthus pauciflorus* ssp. *pauciflorus, Rosa arkansana, Liatris punctata, Pediomelum argophyllum* (= *Psoralea argophylla*), *Aster ericoides, Dalea purpurea*, and *Campanula rotundifolia.*

Wind Cave National Park
Stands of little bluestem typically have somewhat sparse to moderate herbaceous cover, ranging from 20 to 75%. Little bluestem (*Schizachyrium scoparium*) is strongly dominant. Side-oats grama (*Bouteloua curtipendula*) occurs frequently, and may be codominant. Threadleaf sedge may or may not be present. Other frequently-occurring graminoids include blue grama (*Bouteloua gracilis*), hairy grama (*Bouteloua hirsuta*), junegrass (*Koeleria macrantha*) and needle-and-thread (*Stipa comata*). A wide variety of forbs may be present in small amounts, with white sagebrush (*Artemisia ludoviciana*) the most common. Low shrubs are often present, but with less than 20% cover typically. Prairie sagebrush (*Artemisia frigida*) is the most common shrub species found.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

DATABASE CODE CEGL001681

MAP UNITS
The little bluestem - grama grass/threadleaf sedge community corresponds to map unit 15, little bluestem - grama grass/threadleaf sedge herbaceous vegetation, on the Wind Cave vegetation map. Little bluestem grassland with standing dead trees and few or no living trees corresponds to map unit 13, little bluestem - grama grass - threadleaf sedge herbaceous vegetation (with burned ponderosa pine).

COMMENTS
Wind Cave National Park
Significant amounts of little bluestem can be found occasionally in other grassland types, especially the western wheatgrass - green needlegrass type. Kentucky bluegrass often forms a mosaic with western wheatgrass and little bluestem vegetation. The little bluestem community typically occurs on steeper slopes, with Kentucky bluegrass and western wheatgrass vegetation on gentler slopes and in swales.

Little bluestem vegetation is very common. Many stands were visited in preparing the vegetation map. Extensive areas of Kentucky bluegrass vegetation can be found in the eastern half and southwest quarter of the Park, which are predominantly grassland. Smaller stands occur in other areas of the Park in openings in forests and woodlands.

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Stipa comata - Bouteloua gracilis - Carex filifolia Herbaceous Vegetation

COMMON NAME	Needle-and-thread - Blue Grama - Threadleaf Sedge Herbaceous Vegetation
SYNONYM	Needle-and-Thread Grass - Blue Grama Mixedgrass Prairie
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Medium-tall sod temperate or subpolar grassland (V.A.5.N.c)
ALLIANCE	*Stipa comata - Bouteloua gracilis* Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	1
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

This community is common in Montana, Wyoming, and is in Nebraska, North Dakota, South Dakota, southern Saskatchewan, and southern Manitoba. In Nebraska it is apparently absent from extreme northwest and east-central regions (Steinauer and Rolfsmeier 1997).

Wind Cave National Park

Needle-and-thread - blue grama/threadleaf sedge vegetation is uncommon at Wind Cave NP. The largest stands were found in the northeast part of the Park on the summits of broad ridges with thinner, rockier soils. Small patches were found elsewhere as inclusions in other grassland types.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found on flat to gently sloping sites, predominantly with sandy loam or loam soil. The soil is typically 40-100 cm deep.

Wind Cave National Park

Needle-and-thread - blue grama/threadleaf sedge grassland was found on flat to gently sloping sites, with southerly and easterly aspects. The largest stands were found in the northeast part of the Park on the summits of broad ridges with thinner, rockier soils. Small patches were found elsewhere as inclusions in other grassland types.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Herbaceous	*Bouteloua gracilis, Carex filifolia, Pascopyrum smithii, Stipa comata*

Wind Cave National Park

Stratum	Species
Herbaceous	*Bouteloua gracilis, Carex filifolia, Pascopyrum smithii, Stipa comata*

CHARACTERISTIC SPECIES

Globally

Bouteloua gracilis, Carex filifolia, Stipa comata

Wind Cave National Park

Bouteloua gracilis, Carex filifolia, Stipa comata

VEGETATION DESCRIPTION

Globally

This midgrass prairie community is dominated by graminoids that are usually between 0.5 and 1 m tall. The vegetation cover is moderate. The dominant species are *Bouteloua gracilis, Carex filifolia*, and *Stipa comata*, with *Stipa comata* usually the most dominant. *Pascopyrum smithii* is constant in this community and can be locally abundant. *Carex duriuscula* is not always present but is abundant at some sites. Forbs that are typical of this community are *Heterotheca villosa* var. *villosa, Guara coccinea, Liatris punctata,* and *Phlox hoodii*. Sandier areas often have *Calamovilfa longifolia* present. Shrubs rarely grow taller than the grasses, but *Artemisia frigida* is very common in this community. Other grasses that are likely to be present are *Aristida purpurea* var. *longiseta, Koeleria macrantha,* and *Sporobolus cryptandrus*. ^On 19 stands in west-central Montana the cover by the different strata was as

follows: shrubs - 6%, graminoids - 67%, forbs - 11%, bryophytes - 14%, litter - 55%, rock 4%, bare soil - 9% (Mueggler and Stewart 1978). Thilenius et al. (1995) found that the average cover on 14 stands in eastern Wyoming was 42%. Tolstead (1942) described this community as the climax on the level lands of the northern part of Cherry County, Nebraska.

Wind Cave National Park
Stands of needle-and-thread - blue grama/threadleaf sedge have moderate herbaceous cover, typically between 25 and 75%. Needle-and-thread (*Stipa comata*), blue grama (*Bouteloua gracilis*), and threadleaf sedge (*Carex filifolia*) are the dominants. Other frequently-occurring graminoids include western wheatgrass (*Pascopyrum smithii*), junegrass (*Koeleria macrantha*), buffalograss (*Buchloe dactyloides*) and little bluestem (*Schizachyrium scoparium*). Low shrubs are often present, but cover is sparse - less than 20% typically. Prairie sagebrush (*Artemisia frigida*) and downy indigo-bush (*Amorpha canescens*) are the most frequently occurring shrubs.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G5. This is an exceedingly common type, manifesting any number of permutations, some of which are related to disturbance and some of which appear to be related to the expected geographic distinctions in a such a broadly distributed type. The only reason to consider it a G4 is that it has received, and continues to receive, significant grazing pressure, which combined with the surge in alien weed populations, pose a significant threat to its quality.

DATABASE CODE CEGL002037

MAP UNITS
The needle-and-thread - blue grama/threadleaf sedge community corresponds to map unit 18, needle-and-thread - blue grama/threadleaf sedge herbaceous vegetation, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
Needle-and-thread - blue grama/threadleaf sedge vegetation is uncommon at Wind Cave NP, and only a few stands large enough for sampling and mapping were found.

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Hansen, P.L., G. R. Hoffman, and A.J. Bjugstad. 1984. The vegetation of Theodore Roosevelt National Park, North Dakota: A habitat type classification. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-113. Fort Collins, CO. 35 p.

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Poa pratensis Herbaceous Vegetation [Provisional]

COMMON NAME	Kentucky Bluegrass Herbaceous Vegetation
SYNONYM	
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Seasonally flooded temperate or subpolar grassland (V.A.5.N.k)
ALLIANCE	*Poa pratensis* Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is found in California, Oregon, Washington, Idaho, Montana, Wyoming, and South Dakota.

Wind Cave National Park

Extensive areas of Kentucky bluegrass vegetation can be found in the eastern half and southwest quarter of the Park, which are predominantly grassland. In these areas, Kentucky bluegrass often occurs with western wheatgrass and little bluestem vegetation. The little bluestem community typically occurs on steeper slopes, with Kentucky bluegrass and western wheatgrass vegetation on gentler slopes and in swales. Stands also occur in other areas of the Park in openings in forests and woodlands.

ENVIRONMENTAL DESCRIPTION

Globally

This association is poorly defined throughout its range and needs further review.

Wind Cave National Park

Kentucky bluegrass stands occur in a wide variety of habitats throughout the Park. Sites generally are flat to moderate in slope, and are found on all aspects.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Herbaceous	*Poa pratensis*

Wind Cave National Park

Stratum	Species
Herbaceous	*Ambrosia ludoviciana, Artemisia psilostachya, Poa pratensis, Psoralidium tenuiflorum*

CHARACTERISTIC SPECIES

Globally

Poa pratensis

Wind Cave National Park

Poa pratensis

VEGETATION DESCRIPTION

Wind Cave National Park

Stands of Kentucky bluegrass (*Poa pratensis*) typically have moderate to dense herbaceous cover, ranging from 50 to 100%. Kentucky bluegrass contributes at least 75% of that cover. Other common herbaceous species include white sagebrush (*Artemisia ludoviciana*), scurf-pea (*Psoralidium tenuiflorum*) and naked-spike ambrosia (*Ambrosia psilostachya*). Big bluestem (*Andropogon gerardii*) may be present, with high coverage in wetter seasons. On steeper slopes, it is not uncommon to find significant amounts of downy indigo-bush (*Amorpha canescens*) with cover greater than 20%. These shrub stands are recognized as a separate map unit for the Wind Cave vegetation map.

Globally
Information not available.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK GW

DATABASE CODE CEGL003081

MAP UNITS
Kentucky bluegrass often is common or codominant in other grassland types. Only stands in which greater than 75% of the herbaceous cover is Kentucky bluegrass are classified as *Poa pratensis* Herbaceous Vegetation. The Kentucky bluegrass community is one of the types included in map unit 16, western wheatgrass - Kentucky bluegrass complex, on the Wind Cave vegetation map. It is not mapped separately. Kentucky bluegrass stands with standing dead trees and few or no living trees corresponds to map unit 13, western wheatgrass - Kentucky bluegrass complex (with burned ponderosa pine). Kentucky bluegrass stands with leadplant cover greater than 20% are mapped separately as map unit 32, leadplant shrubland.

COMMENTS
Wind Cave National Park
The Kentucky bluegrass type grades into the western wheatgrass - green needlegrass type, and some stands are difficult to classify. Only stands in which greater than 75% of the herbaceous cover is Kentucky bluegrass are classified as *Poa pratensis* Herbaceous Vegetation. Extensive areas of Kentucky bluegrass vegetation can be found in the eastern half and southwest quarter of the Park, which are predominantly grassland. Smaller stands occur in other areas of the Park in openings in forests and woodlands. Kentucky bluegrass often forms a mosaic with western wheatgrass and little bluestem vegetation. The little bluestem community typically occurs on steeper slopes, with Kentucky bluegrass and western wheatgrass vegetation on gentler slopes and in swales.

Kentucky bluegrass herbaceous vegetation is very common. Many stands were visited in preparing the vegetation map.

Kentucky bluegrass is an early, cool-season grass. At Wind Cave NP, stands were found that were dominated by Kentucky bluegrass early in the season, with big bluestem becoming dominant later in the summer.

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Spartina pectinata - Carex spp. Herbaceous Vegetation

COMMON NAME	Prairie Cordgrass - Sedge species Herbaceous Vegetation
SYNONYM	Prairie Cordgrass - Sedge Wet Meadow
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Temporarily flooded temperate or subpolar grassland (V.A.5.N.j)
ALLIANCE	*Spartina pectinata* Temporarily Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Palustrine

RANGE
Globally
This association is found in Montana and western South Dakota.

Wind Cave National Park
The prairie cordgrass - sedge vegetation type is uncommon. Stands were found in drainage bottoms in the north central part of the Park (Sanctuary and Centennial Trail areas).

ENVIRONMENTAL DESCRIPTION
Globally
At Wind Cave NP in South Dakota, prairie cordgrass - sedge stands occur in drainage bottoms where the soil is wet for at least part of the growing season (H. Marriot personal communication 1999).

Wind Cave National Park
Prairie cordgrass - sedge stands occur in drainage bottoms where the soil is wet for at least part of the growing season.

MOST ABUNDANT SPECIES
Globally

Stratum	Species
Herbaceous	*Eleocharis palustris, Carex nebrascensis, Spartina pectinata*

Wind Cave National Park

Stratum	Species
Herbaceous	*Eleocharis palustris, Carex nebrascensis, Spartina pectinata*

CHARACTERISTIC SPECIES
Globally
Eleocharis palustris, Carex nebrascensis, Spartina pectinata

Wind Cave National Park
Eleocharis palustris, Carex nebrascensis, Spartina pectinata

VEGETATION DESCRIPTION
Globally
At Wind Cave NP in South Dakota, this type has dense herbaceous cover, greater than 75%. Species dominance is patchy within stands, with various graminoids locally abundant, often to the exclusion of other species. In the single sampled stand, *Spartina pectinata, Carex nebrascensis,* and *Eleocharis palustris* were locally dominant. *Epilobium ciliatum* was common in shallow water (H. Marriott personal communication 1999).

Wind Cave National Park
Prairie cordgrass - sedge vegetation has dense herbaceous cover, greater than 75%. Species dominance is patchy within stands, with various graminoids locally abundant, often to the exclusion of other species. In the single stand sampled, cordgrass (*Spartina*

pectinata), Nebraska sedge (*Carex nebrascensis*) and pale spikerush (*Eleocharis palustris*) were locally dominant. Hairy willow-herb (*Epilobium ciliatum*) was common in shallow water.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3?

DATABASE CODE CEGL001477

MAP UNITS
The prairie cordgrass - sedge community is one type included in map unit 14, emergent wetland herbaceous complex, on the Wind Cave vegetation map. It is not mapped separately.

COMMENTS
Wind Cave National Park
Stands of prairie cordgrass - sedge vegetation at Wind Cave NP are small. Only a few stands are sufficiently large to map and sample.

Cordgrass - sedge stands dry out later in the growing season during most years.

REFERENCES
Culwell, L.D. and K.L. Scow. 1982. Terrestrial vegetation inventory: Dominy Project Area, Custer County, Montana 1979-1980. Unpublished technical report for Western Energy Company by Westech, Helena, Montana.

Eleocharis palustris Herbaceous Vegetation

COMMON NAME	Pale Spikerush Herbaceous Vegetation
SYNONYM	Creeping Spikerush Wet Meadow
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Seasonally flooded temperate or subpolar grassland (V.A.5.N.k)
ALLIANCE	*Eleocharis palustris* Seasonally Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This widespread association is found in Colorado, Idaho, western South Dakota, Montana, Wyoming, Washington, Oregon, Utah, and Saskatchewan. It may also be in California and Nevada.

Wind Cave National Park

Pale spikerush vegetation is uncommon at Wind Cave NP. Only two stands in depressions were found. A small stand is located near the Highland Creek trailhead. A large stands was found and sampled on Bison Flats. Small patches occur elsewhere in the park, for example along streams.

ENVIRONMENTAL DESCRIPTION

Globally

In northwest Nebraska, this community occurs in small depressions in intermittent stream beds that flood early in the season and dry out by summer. Soils are silty clay formed from weathered siltstone and shale (Steinauer and Rolfsmeier 1997).

Wind Cave National Park

Pale spikerush vegetation is best developed in depressions on broad level sites (e.g. Bison Flats) that hold water for at least part of the growing season. Small patches occur elsewhere, for example along streams.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Herbcaceous	*Eleocharis palustris*

Wind Cave National Park

Stratum	Species
Herbaceous	*Eleocharis palustris*

CHARACTERISTIC SPECIES

Globally

Eleocharis palustris

Wind Cave National Park

Eleocharis palustris

VEGETATION DESCRIPTION

Globally

In northwest Nebraska, stands are dominated by submersed and emergent rooted vegetation under 1 m tall. *Eleocharis acicularis* and *Eleocharis palustris* commonly cover the bottoms of the pools and emerge above the water as the pools dry out. Ephemeral submersed aquatics, such as *Callitriche verna, Potamogeton diversifolius* and *Marsilea vestita*, may be present. As the pools dry out in mid summer, ephemeral annual forbs, such as *Limosella aquatica* and *Plagiobothrys scouleri*, may appear. By late summer *Amaranthus californicus* and *Gnaphalium palustre* may dominate in the lowest parts of the depression (Steinauer and Rolfsmeier 1997). At Wind Cave NP in South Dakota, pale spikerush vegetation is composed of nearly homogeneous stands of pale spikerush

(*Eleocharis palustris*). Other emergents, such as water smartweed (*Polygonum amphibium*), hairy water-fern (*Marsilia vestita*) and ovate spikerush (*Eleocharis ovata*) are occasionally found. Herbaceous cover is greater than 75% except in areas of deeper open water where floating and submerged aquatic plants occur, including roundleaf water-hyssop (*Bacopa rotundifolia*) and blue mud-plantain (*Heteranthera limosa*) (H. Marriott personal communication 1999).

Wind Cave National Park
Pale spikerush vegetation is composed of nearly homogeneous stands of pale spikerush (*Eleocharis palustris*). Other emergents, such as water smartweed (*Polygonum amphibium*), hairy water-fern (*Marsilia vestita*) and ovate spikerush (*Eleocharis ovata*) are occasionally found. Herbaceous cover is greater than 75% except in areas of deeper open water where floating and submerged aquatic plants occur, including roundleaf water-hyssop (*Bacopa rotundifolia*) and blue mud-plantain (*Heteranthera limosa*).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G5

DATABASE CODE CEGL001833

MAP UNITS
The pale spikerush community is one type included in map unit 14, emergent wetland herbaceous complex, on the Wind Cave vegetation map. It is not mapped separately.

COMMENTS
Wind Cave National Park
Pale spikerush vegetation is uncommon at Wind Cave NP. Only two stands in depressions were found, and only one was large enough to sample. Small patches occur along streams also. Small patches of pale spikerush can be found also in stands classified as prairie cordgrass - sedge herbaceous vegetation, and western Great Plains streamside vegetation.

Pale spikerush stand size is dependent on the season's moisture. Pale spikerush stands dry out later in the growing season during most years.

REFERENCES
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Padgett, W.G, A.P. Youngblood, and A.H. Winward. 1988. Riparian community type classification of Utah. USDA Forest Service Intermountain Region Publication R4-Ecol-88-01. Ogden, UT.

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Scirpus spp. - Mixed Herbaceous Great Plains Streamside Herbaceous Vegetation

COMMON NAME	Bulrush - Mixed Herbaceous Great Plains Streamside Herbaceous Vegetation
SYNONYM	Western Great Plains Streamside Vegetation
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Semipermanently flooded temperate or subpolar grassland (V.A.5.N.l)
ALLIANCE	*Typha (angustifolia, latifolia) - (Scirpus* spp.*)* Semipermanently Flooded Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Palustrine

RANGE

Globally

This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park

Western Great Plains streamside vegetation is found along streams that flow for much of the growing season. Exemplary stands can be found along Highland Creek from the north Park boundary south to where the stream disappears, and intermittently along Beaver Creek for much of its length.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park

Western Great Plains streamside vegetation is found in a narrow zone immediately adjacent to streams that flow during much of the growing season (some streams are seasonally-intermittent). This type of vegetation does not develop along streams with steep banks.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Information not available.	

Wind Cave National Park

Stratum	Species
Herbaceous	*Agrostis stolonifera, Glyceria grandis, Poa palustris, Scirpus palidus*

CHARACTERISTIC SPECIES

Globally

Information not available.

Wind Cave National Park

Agrostis stolonifera, Glyceria grandis, Poa palustris, Scirpus palidus

VEGETATION DESCRIPTION

Globally

This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park

Western Great Plains streamside vegetation is dominated by a mix of graminoids and forbs, with herbaceous cover approaching 100%. Dominance is patchy within stands; local dominants include redtop bent (*Agrostis stolonifera*), American mannagrass (*Glyceria grandis*), fowl bluegrass (*Poa palustris*), pale bulrush (*Scirpus pallidus*), pale spikerush (*Eleocharis palustris*), rice cutgrass

(*Leersia oryzoides*) rough bugleweed (*Lycopus asper*), western water-hemlock (*Cicuta douglasii*), and watercress (*Rorippa nasturtium-aquatica*).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G?

DATABASE CODE CEGL005263

MAP UNITS
Western Great Plains streamside vegetation is one type included in map unit 14, emergent wetland herbaceous vegetation, on the Wind Cave vegetation map. It is not mapped separately.

COMMENTS
Wind Cave National Park
Western Great Plains streamside vegetation is infrequent at Wind Cave NP. Only a few stands are large enough to map, two of which were sampled during this project. Some streams on which this occurs are seasonally-intermittent.

REFERENCES

Bromus tectorum Herbaceous Vegetation [Provisional]

COMMON NAME	Cheatgrass Herbaceous Vegetation
SYNONYM	Cheatgrass Annual Grassland
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Annual graminoid or forb vegetation (V.D)
PHYSIOGNOMIC GROUP	Temperate or subpolar annual grasslands or forb vegetation (V.D.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.D.2.N)
FORMATION	Short temperate annual grassland (V.D.2.N.d)
ALLIANCE	*Bromus tectorum* Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM Upland

RANGE
Globally
This association was newly derived from Black Hills data and needs further rangewide review.

Wind Cave National Park
Most stands of weedy non-native graminoids at Wind Cave NP are small. Only one of mappable size was found, in the vicinity of the Sanctuary/Centennial trail junction. The type is most commonly found along roads.

ENVIRONMENTAL DESCRIPTION
Globally

Wind Cave National Park
Weedy non-native graminoid vegetation occurs on recently-disturbed areas, most commonly along roads. Small stands occur in prairie dog towns also.

MOST ABUNDANT SPECIES
Globally

Stratum	Species

Information not available.

Wind Cave National Park

Stratum	Species
Herbaceous	*Bromus japonicus, Bromus inermis, Bromus tectorum*

CHARACTERISTIC SPECIES
Globally
Information not available.

Wind Cave National Park
Bromus japonicus, Bromus inermis, Bromus tectorum

VEGETATION DESCRIPTION
Globally
This association was newly derived from Black Hills data and needs further rangewide review.

Wind Cave National Park
Weedy non-native graminoid vegetation is usually dominated by several perennial and annual bromegrasses, including smooth brome (*Bromus inermis*), Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*). Cover is variable.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK GW

DATABASE CODE CEGL003019

MAP UNITS
Introduced weedy graminoid herbaceous vegetation corresponds to map unit 17, introduced grassland herbaceous alliance, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
Most stands of weedy non-native graminoids at Wind Cave NP are small. Only one of mappable size was found.

REFERENCES
Sawyer, J.O. and T. Keeler-Wolf. 1995. A manual of California vegetation. California Native Plant Society, Sacramento, California. 471 pp.

Cirsium arvense - Weedy Forb Great Plains Herbaceous Vegetation [Provisional]

COMMON NAME	Canada Thistle - Weedy Forb Herbaceous Vegetation [Provisional]
SYNONYM	Great Plains Weedy Meadows
PHYSIOGNOMIC CLASS	Herbaceous (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	
ALLIANCE	[Not developed]

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE
Globally
This association was newly derived from Black Hills data and needs further rangewide review.

Wind Cave National Park
Recent burn sparse vegetation is found in areas of recent prescribed fires at Wind Cave NP.

ENVIRONMENTAL DESCRIPTION
Globally
This association was newly derived from Black Hills data and needs further rangewide review.

Wind Cave National Park
Recent burn sparse vegetation is found on sites of all aspects and slopes that have been well-burned within the past several years.

MOST ABUNDANT SPECIES
Globally

Stratum	Species

Information not available.

Wind Cave National Park

Stratum	Species
Herbaceous	*Cirsium arvense, Conyza canadensis, Oryzopsis micrantha, Verbascum thapsus*

CHARACTERISTIC SPECIES
Globally
Information not available.

Wind Cave National Park
Informatio not available.

VEGETATION DESCRIPTION
Globally
This association was newly derived from Black Hills data and needs further rangewide review.

Wind Cave National Park
Cover and species composition of recent burn sparse vegetation is quite variable, both among and within stands. Some areas support lush growth of early successional species; others are largely bare blackened soil. Common species include Canada thistle (*Cirsium arvense*), mullein (*Verbascum thapsus*), little mountain-ricegrass (*Oryzopsis micrantha*), hoarhound (*Marrubium vulgare*) and Canada horseweed (*Conyza canadensis*). Typically there is an overstory of standing dead trees.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK GW

DATABASE CODE CEGL005260

MAP UNITS
Recent burn sparse vegetation is one of the types included in map units 11, 12 and 13, burned ponderosa pine woodlands, on the Wind Cave vegetation map. It is not mapped separately.

COMMENTS
Wind Cave National Park
The recent burn sparse vegetation type develops only after fires hot enough to kill most of the understory. Recently-burned stands with intact shrub and/or herbaceous strata are classifed as the appropriate shrub or herbaceous vegetation type.

The recent burn sparse vegetation type is an early successional stage that develops on well-burned sites during the first few years following a fire. The recent burn sparse vegetation type often occurs in a mosaic with unburned or partially burned pine forest and woodland types.

A large percentage of the recent burn sparse vegetation at Wind Cave NP was visited during the mapping project.

REFERENCES

Prairie Dog Town Grassland Complex

COMMON NAME	Prairie Dog Town Grassland Complex
SYNONYM	Prairie Dog Town Grassland Complex
PHYSIOGNOMIC CLASS	Not applicable
PHYSIOGNOMIC SUBCLASS	Not applicable
PHYSIOGNOMIC GROUP	Not applicable
PHYSIOGNOMIC SUBGROUP	Not applicable
FORMATION	Not applicable
ALLIANCE	Not applicable

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE
Globally
This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park
Prairie dog towns are scattered throughout Wind Cave NP. The largest are in the southwest part of the Park.

ENVIRONMENTAL DESCRIPTION
Globally
This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park
Prairie dog town grassland complex is found on level to moderately sloping sites of all aspects, on highly-disturbed soil. This type is best developed in dog towns on flat to gently-rolling terrain.

MOST ABUNDANT SPECIES
Globally

Stratum	Species
Information not available.	

Wind Cave National Park

Stratum	Species
Herbaceous	*Aristida purpurea, Conyza ramosissima, Cirsium arvense, Dyssodia papposa, Verbena bracteata*

CHARACTERISTIC SPECIES
Globally
Information not available.

Wind Cave National Park
Aristida purpurea, Conyza ramosissima, Cirsium arvense, Dyssodia papposa, Verbena bracteata

VEGETATION DESCRIPTION
Globally
This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park
The prairie dog town grassland complex type is variable in terms of herbaceous cover, averaging from 20 to 50% with patches of 100% cover common. Purple three-awn (*Aristida purpurea*) is often strongly dominant locally, but distribution is intermittent. Stands typically are quite patchy in terms of species distribution, with dominance varying locally. Other local dominants include large-bract vervain (*Verbena bracteata*), Canada thistle (*Cirsium arvense*), common hoarhound (*Marrubium vulgare*), dwarf conyza (*Conyza ramosissima*) and fetid dogweed (*Dyssodia papposa*).

Prairie dog town grassland complexes are patchy in terms of species distribution, with dominance varying locally within a stand. This is typical of early successional species on disturbed sites.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G?

DATABASE CODE CECX002003

MAP UNITS
The prairie dog town grassland complex corresponds to map unit 1, purple three-awn - fetid marigold herbaceous vegetation, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
Prairie dog town grassland complex vegetation occurs on the naturally-disturbed soils of prairie dog towns. Prairie dog town grassland complex vegetation is quite patchy, and variable in terms of species distribution, with dominance varying locally within a stand. This is typical of early successional species on disturbed sites.

Prairie dog town grassland complexes at Wind Cave NP range from less than a half ha to over five ha in size. The prairie dog town grassland complex type was well-surveyed during preparation of the vegetation map.

REFERENCES

Redbeds (Siltstone, Sandstone, Gypsum) Sparse Vegetation

COMMON NAME	Redbeds (Siltstone, Sandstone, Gypsum) Sparse Vegetation
SYNONYM	Redbeds Rock Outcrop
PHYSIOGNOMIC CLASS	Sparse Vegetation (VII)
PHYSIOGNOMIC SUBCLASS	Consolidated rock sparse vegetation (VII.A)
PHYSIOGNOMIC GROUP	Sparsely vegetated cliffs (VII.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (VII.A.1.N)
FORMATION	Cliffs with sparse vascular vegetation (VII.A.1.N.a)
ALLIANCE	Rock Outcrop/Butte Sparsely Vegetated Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park

The redbeds sparse vegetation type is uncommon and restricted to the Red Valley in the eastern part of the Park.

ENVIRONMENTAL DESCRIPTION

Globally

This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park

Redbeds sparse vegetation is found in areas underlain by red sandstones and siltstones of the Spearfish Formation. Gypsum lenses are common, and form resistant bands and caps. Soils are poor, loose, and easily eroded. This type is found on level sites and slopes of varied steepness and aspect.

MOST ABUNDANT SPECIES

Globally

Stratum	Species
Information not available.	

Wind Cave National Park

Stratum	Species
Herbaceous	Variable

CHARACTERISTIC SPECIES

Globally

Information not available.

Wind Cave National Park

Heterotheca villosa, Paronychia depressa, Eriogonum pauciflorum

VEGETATION DESCRIPTION

Globally

This association has been derived based on data from the Black Hills. Rangewide information has not yet been compiled.

Wind Cave National Park

The redbeds sparse vegetation type typically has less than 10% vegetative cover. Species that are often present include sand cherry (*Prunus pumila*), prairie sagebrush (*Artemisia frigida*), needle-and-thread (*Stipa comata*), little bluestem (*Schizachyrium scoparium*), hairy golden-aster (*Heterotheca villosa*), Rocky Mountain nail-wort (*Paronychia depressa*) and wild buckwheat (*Eriogonum pauciflorum*).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G?

DATABASE CODE CEGL005261

MAP UNITS
Redbeds sparse vegetation corresponds to map unit 3, gypsum rock outcrop/redbeds sparse vegetation, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
Redbeds sparse vegetation develops on naturally eroded sites underlain by the Spearfish Formation. They occur as small inclusions in grassland vegetation. Gypsum zones within the redbeds also are sparsely vegetated, with the same species commonly found.

The redbeds sparse vegetation type is uncommon and restricted to the Red Valley. Many of these stands were visited during vegetation mapping.

REFERENCES

Black Hills Granite/Metamorphic Rock Outcrop Sparse Vegetation

COMMON NAME	Black Hills Granite/Metamorphic Rock Outcrop Sparse Vegetation
SYNONYM	Black Hills Granite/Metamorphic Rock Outcrop
PHYSIOGNOMIC CLASS	Sparse Vegetation (VII)
PHYSIOGNOMIC SUBCLASS	Consolidated rock sparse vegetation (VII.A)
PHYSIOGNOMIC GROUP	Sparsely vegetated cliffs (VII.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (VII.A.1.N)
FORMATION	Cliffs with sparse vascular vegetation (VII.A.1.N.a)
ALLIANCE	Rock Outcrop/Butte Sparsely Vegetated Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This association is found in western South Dakota and may be related to rock outcrops in the Rocky Mountains.

Wind Cave National Park

No mappable stands of Black Hills rock outcrop sparse vegetation were found within Wind Cave NP. However, the type is common just west of the Park on Forest Service lands.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found where granite or schist bedrock is exposed in the higher elevations of the Black Hills. Slopes range from none (flat) to steep. There is little soil development; what soil there is can be found in cracks and depressions in the rock surface.

Wind Cave National Park

Black Hills Rock Outcrop Sparse Vegetation occurs on large granite and schist outcrops.

MOST ABUNDANT SPECIES

Globally

Stratum	Species

Few vascular species occur in this association.

Wind Cave National Park

Stratum	Species

Few vascular species occur in this association.

CHARACTERISTIC SPECIES

Globally

Few vascular species occur in this association.

Wind Cave National Park

Few vascular species occur in this association.

VEGETATION DESCRIPTION

Globally

Few vascular plants grow in this community, although lichens are common. Widely scattered *Pinus ponderosa* grow in cracks and crevices. Dwarf-shrubs and herbaceous species, such as *Arctostaphylos uva-ursi, Juniperus communis, Campanula rotundifolia*, and *Carex inops* ssp. *heliophila*, can be found in soil pockets.

Wind Cave National Park

Black Hills rock outcrop sparse vegetation typically consists of scattered ponderosa pine trees, shrubs and herbaceous species growing in crevices and pockets of soil. Squaw-bush (*Rhus trilobata*), kinnikinnik (*Arctostaphylos uva-ursi*), chokecherry (*Prunus virginiana*) and harebell (*Campanula rotundifolia*) are often found at these sites.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4G5

DATABASE CODE CEGL002295

MAP UNITS
This type includes granite and schist outcrops. Other rock outcrops found in the Black Hills are not included (e.g. limestones and sandstones). Black Hills rock outcrop sparse vegetation corresponds to map unit 4, granite/schist rock outcrop sparse vegetation, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
This type includes granite and schist outcrops. Other rock outcrops found in the Black Hills are not included (e.g. limestones and sandstones).

REFERENCES

Pinus ponderosa Limestone Cliff Sparse Vegetation

COMMON NAME	Ponderosa Pine Limestone Cliff Sparse Vegetation
SYNONYM	Ponderosa Pine Limestone Cliff
PHYSIOGNOMIC CLASS	Sparse Vegetation (VII)
PHYSIOGNOMIC SUBCLASS	Consolidated rock sparse vegetation (VII.A)
PHYSIOGNOMIC GROUP	Sparsely vegetated cliffs (VII.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (VII.A.1.N)
FORMATION	Cliffs with sparse vascular vegetation (VII.A.1.N.a)
ALLIANCE	Open Bluff/Cliff Sparsely Vegetated Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE
Globally
This association is found in western South Dakota and western Nebraska.

Wind Cave National Park
Limestone outcrops are common in the central part of Wind Cave NP (east of Hwy 387 and west of NPS Rd. 5). Large cliffs are found along drainages, especially where streams have cut through the Minnekahta limestone. Most outcrops are too small to map, and so occur as inclusions in other types. Some areas with clusters of small limestone outcrops have been mapped separately.

ENVIRONMENTAL DESCRIPTION
Globally
At Wind Cave NP in South Dakota,, stands are found around large exposures of Pahasapa and Minnekahta limestones. These outcrops occur on ridgetops, slopes and in drainage bottoms (H. Marriott personal communication 1999).

Wind Cave National Park
The ponderosa pine - limestone outcrop sparse vegetation type is found around large exposures of Pahasapa and Minnekahta limestones. These outcrops occur on ridgetops, slopes and in drainage bottoms.

MOST ABUNDANT SPECIES
Globally
Stratum Species
Information not available.

Wind Cave National Park
Stratum Species
Few vascular species occur in this association.

CHARACTERISTIC SPECIES
Globally
Information not available.

Wind Cave National Park
Few vascular species occur in this association.

VEGETATION DESCRIPTION
Globally
At Wind Cave NP in South Dakota, large outcrops of limestone have very sparse vegetative cover at most. Where smaller outcrops occur, they often are surrounded by some type of ponderosa pine forest or woodland. Several shrub species are often found associated with limestone rock outcrops, including *Prunus virginiana, Rhus trilobata* and *Toxicodendron pubescens* (H. Marriott personal communication 1999).

Wind Cave National Park
Large outcrops of limestone have very sparse vegetative cover at most. Where smaller outcrops occur, they often are surrounded by some type of ponderosa pine forest or woodland. Several shrub species are often found associated with limestone rock outcrops, including chokecherry (*Prunus virginiana*), squawbush (*Rhus trilobata*) and poison ivy (*Toxicodendron pubescens*).

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G?

DATABASE CODE CEGL002055

MAP UNITS
Ponderosa pine limestone cliff sparse vegetation corresponds to map unit 2, limestone rock outcrop sparse vegetation, on the Wind Cave vegetation map.

COMMENTS
Wind Cave National Park
Most limestone outcrops are small. Sizeable cliffs are found in canyons that cut through the Minnekahta limestone (east of Hwy 387 and west of NPS Rd. 5). Most outcrops are not mappable, including many of the larger cliffs which have very little horizontal area. Some areas with clusters of small limestone outcrops have mapped separately.

REFERENCES

Shale Barren Slopes Sparse Vegetation

COMMON NAME	Shale Barren Slopes Sparse Vegetation
SYNONYM	Shale Barren Slopes
PHYSIOGNOMIC CLASS	Sparse Vegetation (VII)
PHYSIOGNOMIC SUBCLASS	Consolidated rock sparse vegetation (VII.A)
PHYSIOGNOMIC GROUP	Sparsely vegetated cliffs (VII.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (VII.A.1.N)
FORMATION	Cliffs with sparse vascular vegetation (VII.A.1.N.a)
ALLIANCE	Open Bluff/Cliff Sparsely Vegetated Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE
Globally
This association is found in South Dakota and North Dakota.

Wind Cave National Park
Mappable stands of shale barren slope sparse vegetation occur on the east slope of Boland Ridge, east of the Park boundary. This area is under private ownership, and was not accessible for survey.

ENVIRONMENTAL DESCRIPTION
Globally
More information is needed to determine the characteristics of this type. The type includes the Mowry Shale outcrops around the Black Hills and the Pierre Shale outcrops of central and western South Dakota. The Mowry Shale outcrops can grade into Quercus macrocarpa / Carex inops ssp. heliophila Woodland or Pinus ponderosa Woodlands, both with relatively sparse ground cover.

Wind Cave National Park
Mappable stands of shale barren slope sparse vegetation occur on the east slope of Boland Ridge, east of the Park boundary. This area is under private ownership, and was not accessible for survey.

MOST ABUNDANT SPECIES
Globally
Stratum Species
Information not available.

Wind Cave National Park
Stratum Species
Information not available.

CHARACTERISTIC SPECIES
Globally
Information not available.

Wind Cave National Park
Information not available.

VEGETATION DESCRIPTION
Globally
Information not available.

Wind Cave National Park
Mappable stands of shale barren slope sparse vegetation occur on the east slope of Boland Ridge, east of the Park boundary. This area is under private ownership, and was not accessible for survey.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G?

DATABASE CODE CEGL002294

MAP UNITS
The shale barren slope sparse vegetation community corresponds to map unit 5, shale barren slopes sparse vegetation, on the Wind Cave vegetation map.

COMMENTS

REFERENCES